CORE
Metadata, citation and similar papers at core.ac.uk
Provided by ePrints@TNMGRM (Tamil Nadu Dr. M.G.R. Medical University)

A DISSERTATION ON

"INCIDENCE OF RECURRENT LARYNGEAL NERVE PALSY IN THYROIDECTOMY-IDENTIFICATION VERSUS NON-IDENTIFICATION OF RECURRENT LARYNGEAL NERVE"

Dissertation submitted to

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY CHENNAI

In partial fulfillment of the requirement for the degree of

M.S. DEGREE IN GENERAL SURGERY

BRANCH – I

MADRAS MEDICAL COLLEGE

RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL

CHENNAI – 600 003.

MADRAS MEDICAL COLLEGE

RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL

CHENNAI – 600 003.

APRIL – 2013

CERTIFICATE

This is to certify that the dissertation titled

"INCIDENCE OF RECURRENT LARYNGEAL NERVE PALSY IN THYROIDECTOMY-IDENTIFICATION VERSUS NON-IDENTIFICATION OF RECURRENT LARYNGEAL NERVE"

is the original work done by **DR.A.NAVEETH SHUKKUR**, post graduate in M.S., General surgery at the department of general surgery, madras medical college, Chennai 600 003 to be submitted to the Tamilnadu Dr.M.G.R Medical university, Chennai 600 032, towards the partial fulfillment of the requirement for the award of M.S.,degree in General Surgery during the academic period from May 2010 – April 2013.

PROF G. MURALIDHARAN M.S.,
Professor, Department of General Surgery,
Madras medical college, Chennai - 600003.

PROF.S.DEIVANAYAGAM, M.S.,
Professor &Head of department,
Department of General surgery,
Madras medical college

Dr.V.KANAGASABAI, M.D.,
Dean,
Madras Medical College

DECLARATION

I solemnly declare that the dissertation titled

"INCIDENCE OF RECURRENT LARYNGEAL NERVE PALSY IN THYROIDECTOMY-IDENTIFICATION VERSUS NON-IDENTIFICATION OF RECURRENT LARYNGEAL NERVE"

was done by me at Rajiv Gandhi Government General Hospital, Chennai-600003 during the period of May 2010 to November 2012 under the guidance and supervision of Prof G.Muralidharan M.S.,

The dissertation is submitted to the Tamil Nadu Dr.M.G.R Medical University, Chennai towards the partial fulfillment of the requirement for the award of **MS Degree in General Surgery Branch –I**

Dr.A.NAVEETH SHUKKUR

Place :

Date :

ACKNOWLEDGEMENT

I hereby wish to express my grateful acknowledgement to the following without those help this study would not have been possible.

I thank our beloved Dean **Dr.V.Kanagasabai M.D.,** for allowing me to conduct this study in the Rajiv Gandhi Government General Hospital, Chennai.

My profound gratitude to P**rof S.Deivanayagam M.S.,** Professor & Head of Department of General Surgery for guiding me throughout the period of this work at Madras Medical College, Chennai-600003..

My sincere thanks to my chief beloved **Prof. G.MURALIDHARANM.S.,** for his guidance and supervision throughout my career and in carrying out this dissertation.

My humble gratitude & sincere thanks to my former chief & beloved **Prof.VSHRUTHI KAMAL .MS.,** for his guidance throughout my career.

I am bound by ties of gratitude to my respected Assistant Professors, Dr.D.Tamilselvan , Dr.D.Manivannan , Dr.S.P.Gayathri in general, for placing and guiding me on the right track from the very beginning of my career in Surgery and

till this day. I would be failing in my duty if I don't place on record my sincere thanks to those patients who inspite of their sufferings extended their fullest co-operation.

I thank my family members especially my wife and parents who always encouraged me whenever I needed help and support.

Lastly, I express my thanks to my patients without them this study would not have been possible.

Dr.A.NAVEETH SHUKKUR

“INCIDENCE OF RECURRENT LARYNGEAL NERVE PALSY IN THYROIDECTOMY-

IDENTIFICATION

VERSUS

NON-IDENTIFICATION OF RECURRENT LARYNGEAL NERVE”

INTRODUCTION:

Surgery of the thyroid is one of the most common surgical procedures. One of the dreaded complications following thyroid surgery is recurrent laryngeal nerve (RLN) palsy. Various techniques of thyroidectomy have been described historically to avoid the injury to recurrent laryngeal nerve. The rate of recurrent laryngeal nerve injury is about **1-5%** in the hands of an experienced surgeon & the rate varies according to the expertise of the operating surgeon.

One area of much debate among the surgeons is the dissection of recurrent laryngeal nerve. One school of thought is to stay away from the recurrent laryngeal nerve. Their view is if the nerve is seen, it's injured. Nowadays it is said that we should dissect out the nerve along its entire course for preserving its function and avoid inadvertent injury to the nerve.

I am going to study about the technique of thyroidectomy and association of nerve injury with identification and non identification of recurrent laryngeal nerve.

AIMS AND OBJECTIVES:

AIM OF THE STUDY:

To study the incidence of recurrent laryngeal nerve palsy in thyroidectomy in identification versus non-identification of recurrent laryngeal nerve.

PRIMARY OBJECTIVE :

To assess the risk of recurrent laryngeal nerve palsy (RLNP) after thyroidectomy with and without routine identification of the recurrent laryngeal nerve (RLN) during thyroidectomy

SECONDARY OBJECTIVE :

To know about the incidence of recurrent laryngeal nerve palsy in association with different techniques of thyroidectomy

MATERIALS AND METHODS:

It is a prospective study. Patients undergoing thyroid surgery were divided randomly in to two groups A and B. In group A, a standard protocol was maintained wherein the recurrent laryngeal nerve was identified routinely & the nerve in its entire course till its entry into larynx is traced and ligation of inferior thyroid artery done. In group B, the nerve was not identified routinely and the inferior thyroid artery was ligated away from the gland.

For all patients thorough history was taken including the history of any recent change in voice & physical examination done. USG of the swelling was done & FNAC of the swelling done. All patients underwent ENT examination & IDL done to know about the status of vocal cords.

Inclusion criteria:

Indications for surgery were for both benign & malignant disorders. Multinodular goiter, solitary nodular goitre, pappilary carcinoma, follicular carcinoma

Exclusion criteria:

Any patients who had previous thyroid surgery, previously present symptomatic or asymptomatic vocal cord palsy were excluded from the study .Patients having anaplastic carcinoma also excluded from the study.

Follow up:

Patient had a laryngoscopic examination immediately after ex-tubation and checked for position of vocal cords. On the first post op day any change in voice or hoarseness is elicited from the patient. Patient had laryngoscopic examination on the 5^{th} post operative day before discharge. Patient was advised to follow up for change in voice and any deviation of vocal cords by laryngoscopy at third and sixth month.

The most frequent and unpleasant complication of thyroid surgery is permanent recurrent laryngeal nerve palsy (RLNP) resulting from intra operative damage. It can happen during surgery because of direct mechanical damage with or without disruption.

Any hoarseness of voice associated with a documented shift of vocal cords persisting after sixth month is taken as permanent recurrent nerve injury.in case of recurrent laryngeal nerve injury there will be change in voice in the immediate post op period. Hoarseness of voice occurring in the 1st or 2nd post op day is mostly due to edema caused by inflammation & dissection of nerves & it is temporary.

Delayed RLNP within hours to a few days after surgery is thought to be caused by pressure of oedema or hematoma. Besides hoarseness, this also occurs in unilateral RLNP, bilateral RLNP leads to dyspnoea and often to life threatening glottal obstruction. Therefore, methods that prevent recurrent laryngeal nerve palsies are of great interest.

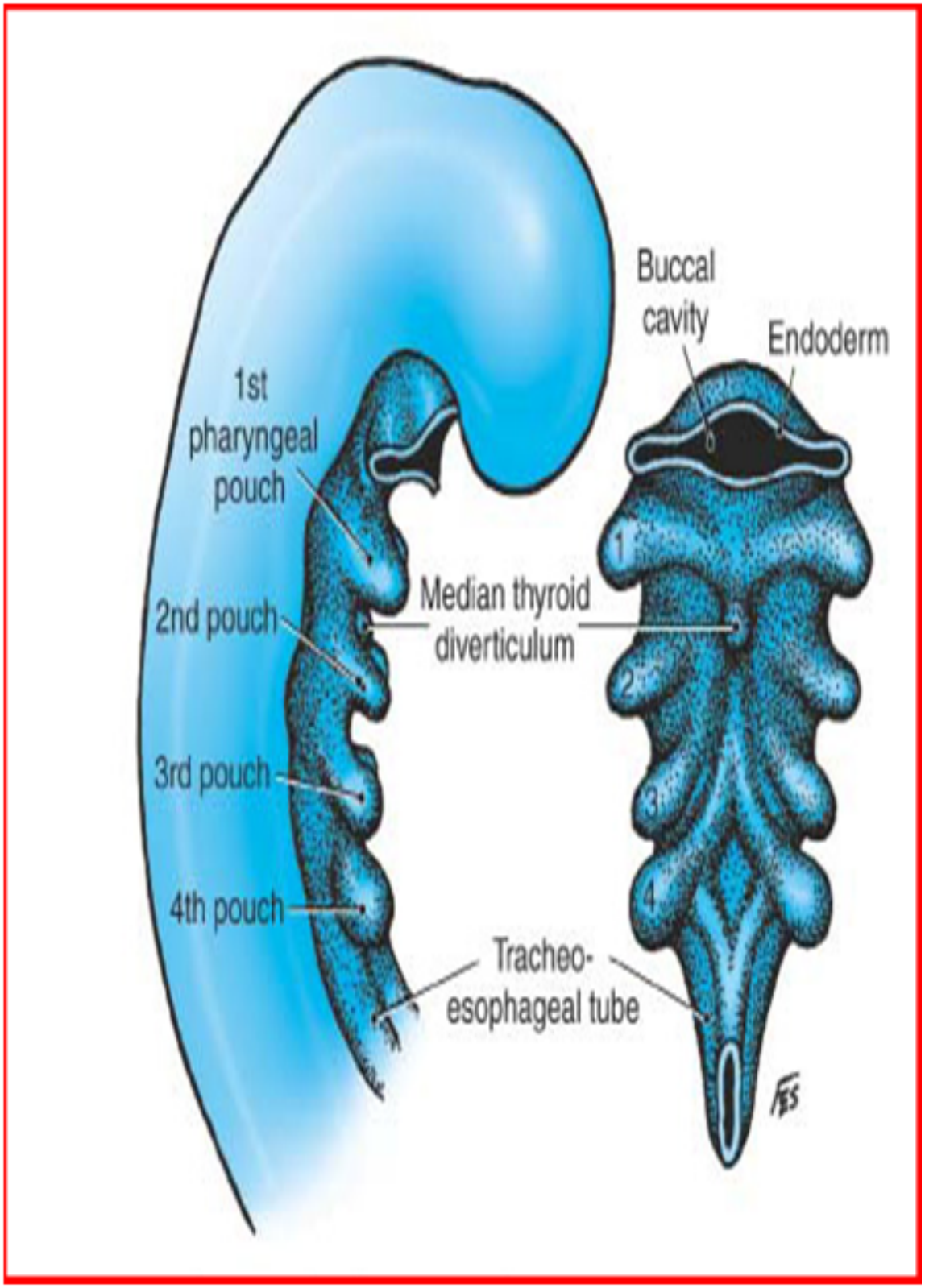
We conducted a study to determine whether identification of the RLN reduces the number of permanent recurrent laryngeal nerve palsies by comparing it with non identification of RLN.

REVIEW OF LITERATURE:

Every surgeon should have a thorough understanding of the anatomy of the recurrent laryngeal nerve, its relationship to the thyroid gland, to the inferior thyroid artery and also know about the variations in order to avoid injury to the nerve.

DEVELOPEMENT OF THYROID:

The thyroid gland has a dual origin. It arises from the primitive pharynx and the neural crest. The main central portion of thyroid originates from the primitive pharynx. It appears in between second and third week of intra uterine life. The large median thyroid anlage develops as a tubular duct which descends down from the foramen cecum in the region of developing tongue, passes caudally in front of hyoid bone behind which it forms a recurrent loop and descends below and to the left. The tip of the duct bifurcates and the isthmus and two lobes of the gland are formed. The descending duct from the floor of the mouth is known as thyroglossal duct.



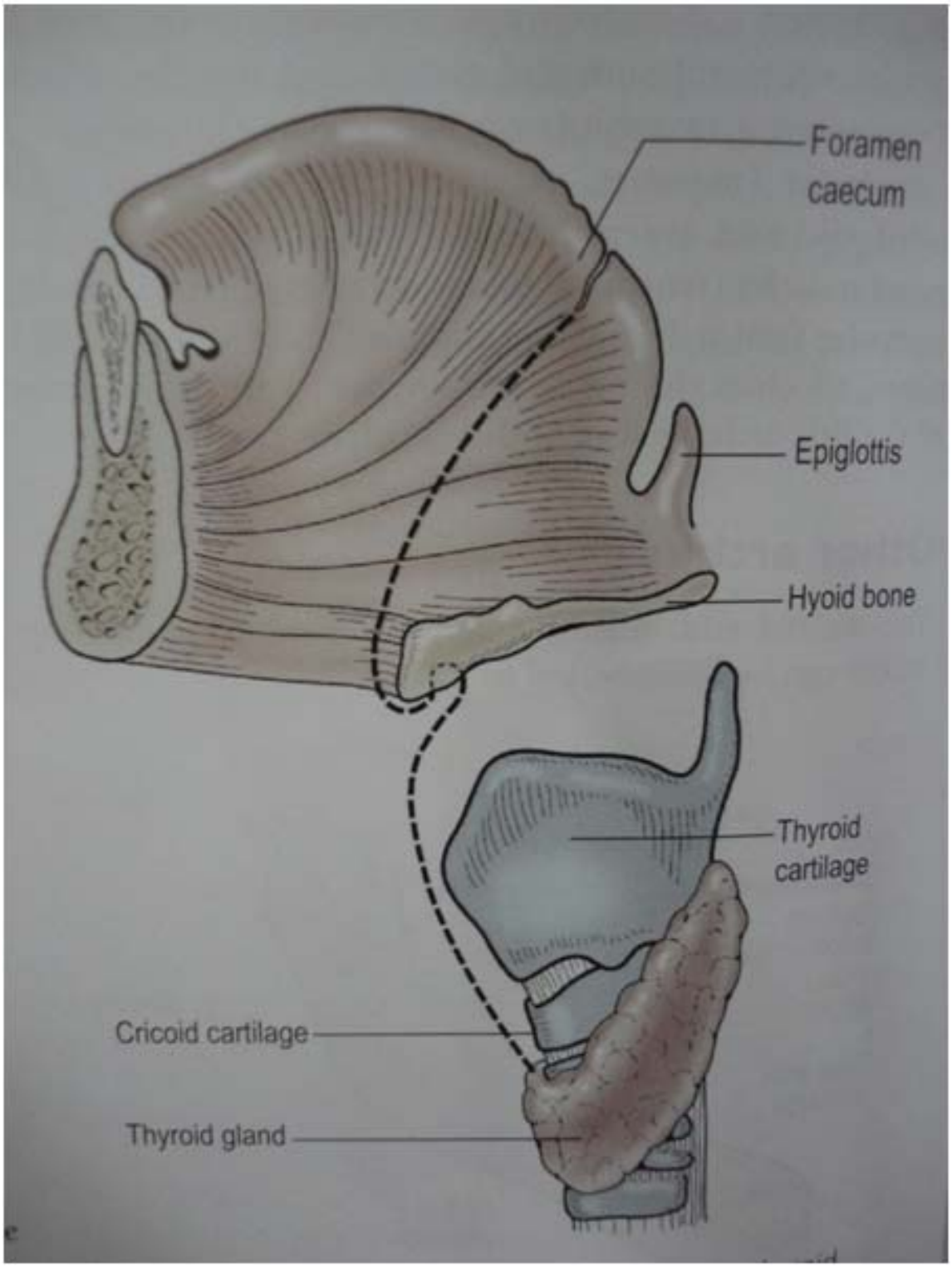
DEVELOPMENT IN EMBRYO

The developing gland is a tubular structure which forms a solid cord of cells that will later become the follicles. Iodine trapping and colloid formation occurs in eleventh week of gestation.

Sometimes the thyroglossal duct may pass through the hyoid bone instead of passing anteriorly to it. The thyroglossal duct obliterates in to multiple fragments by fifth month. The thyroglossal duct is sometimes present upwards of the pyramidal lobe in about 50 percent of the population.

Developmental abnormalaties of thyroid:

Abnormalities in thyroid development are of two types. They are, failure of gland to develop and migrate properly, and differentiation of the gland in abnormal location. If the thyroid fails to descend totally a lingual thyroid is present. Lingual thyroid is present in the region of foramen caecum of tongue. Most of these ectopic thyroid tissues are usually hypo functioning and the patient may present with hypothyroidism and lingual swelling. In such cases before doing surgery we should do USG of neck to see whether normal thyroid is present or not. Most of the ectopic thyroid rests are found along the route of normal descent of the gland and thus they are situated caudal to thyroid cartilage. The heart has a mechanical effect in the descent of thyroid so, occasionally, thyroid may sometimes descent in to the mediastinum.

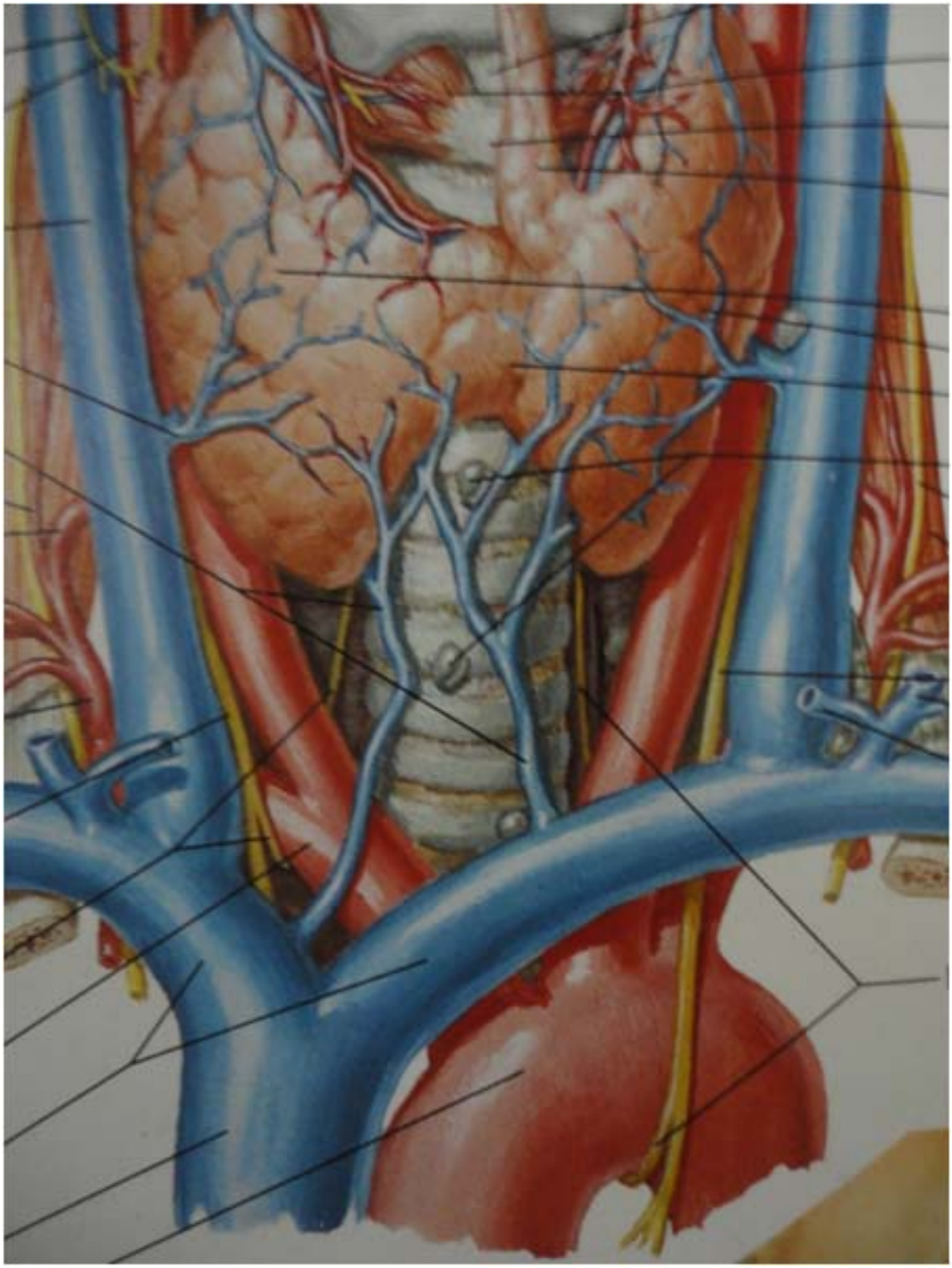


DEVELOPMENT OF THYROID- PATHWAY OF DESCENT

ANATOMY OF THYROID:

Thyroid is a shield like organ present low in front of the neck. Thyroid got its name from the greek word “thyreos,” which means shield. It consists of two symmetrical lobes which are united in front by the isthmus. The lobes lie on either side of the trachea. The lateral lobes extend from the oblique line of thyroid cartilage to the sixth tracheal ring. The lobes are pear shaped and appear triangular in cross section. It has three surface –medial, lateral and posterior, and two poles- superior and inferior.

The lateral surface is superficial and is covered by the sternohyoid and sternothyroid- the strap muscles. The sternohyoid meets in midline whereas the sternothyroid is lateral and do not meet. The medial surface is related to the lateral side of larynx and upper trachea with pharynx and oesophagus behind these. This surface is related to the inferior constrictor, cricothyroid and also the recurrent laryngeal nerve. Posterior surface overlaps the medial part of carotid sheath containing the common carotid artery. If enlarged, it will come to lie across internal jugular vein and the carotid pulsation will be felt lateral to the enlarged gland. The posteromedial aspects of the lobes are attached to the side of the cricoid cartilage by a lateral ligament. Upper pole is tapering and the lower pole is broad.



ANTERIOR VIEW OF THYROID

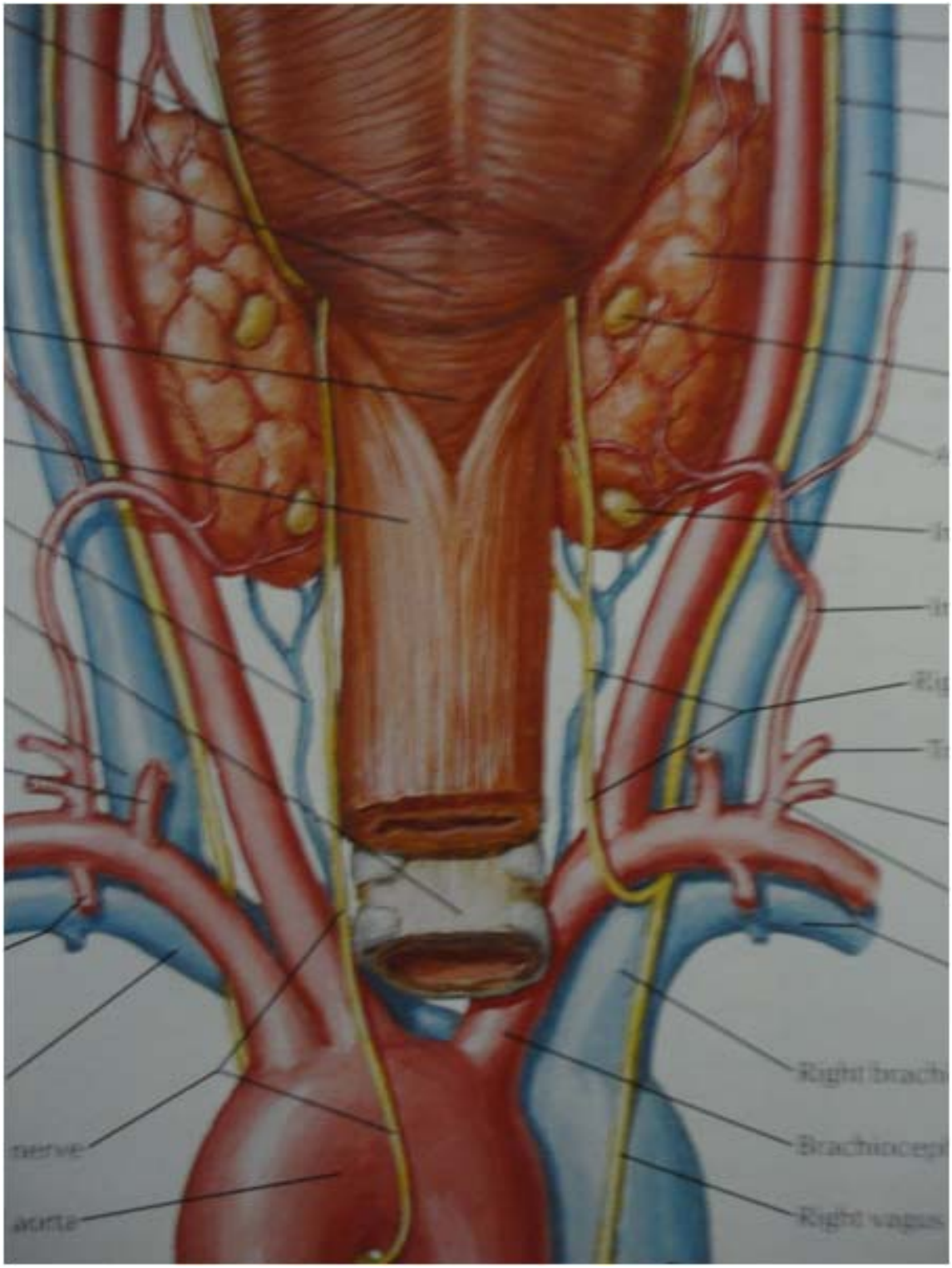
The isthmus connects the two lobe of thyroid close to the lower pole. It consists of two surfaces-anterior and posterior, and two borders- superior and inferior. The posterior surface of isthmus is closely adherent to trachea and second, third and fouth tracheal rings. This fixation and investment of whole gland by the pre-trachaeal fascia, which is attached to the oblique line of thyroid cartilage and hyoid, is responsible for the movement of gland on deglutition. On the superior border, the anterior branches of superior thyroid artery of both sides anastomose with each other. On the inferior border the tributaries leave the gland.

A small portion of the gland projects upward from the isthmus generally to the left of midline known as pyramidal lobe. It represents development of glandular tissue from the caudal end of thyroglossal duct. It sometimes may be attached to the inferior border of hyoid by fibrous tissue in which few muscular elements may be present called musculus levator glandulae thyroideae. If present it is innervated external laryngeal nerve. In 10% of patients the isthmus is absent, and the pyramidal lobe is present in only 50% of persons.

Thyroid gland is covered by a connective tissue capsule. This capsule sends septations in to the gland. These make the stroma of the gland. This forms the true capsule of thyroid.

Outside of the true capsule, the pre tracheal fascia forms a well developed fascial layer. This fascial layer formed from the pre tracheal fascia is the false capsule of thyroid. It is also known as surgical capsule. Because it is between these two capsules surgery is performed. The fascia is well developed anteriorly and laterally. But the fascia is loose and flimsy posteriorly. As a result if the thyroid gland enlarges it does so posteriorly. The pre tracheal fascia is thickened posteriorly and it fixes the posterior part of the thyroid to the cricoid cartilage bilaterally. The thickened fascia present posteriorly is called the ligaments of berry. During thyroidectomy the false capsule won't be removed.

The superior parathyroid has a more fixed position. It is present in between the two capsules of the thyroid. The inferior parathyroids position is variable. It may be found in between the capsule, within the substance of the gland or it may be situated outside of false capsule.



POSTERIOR VIEW OF THYROID

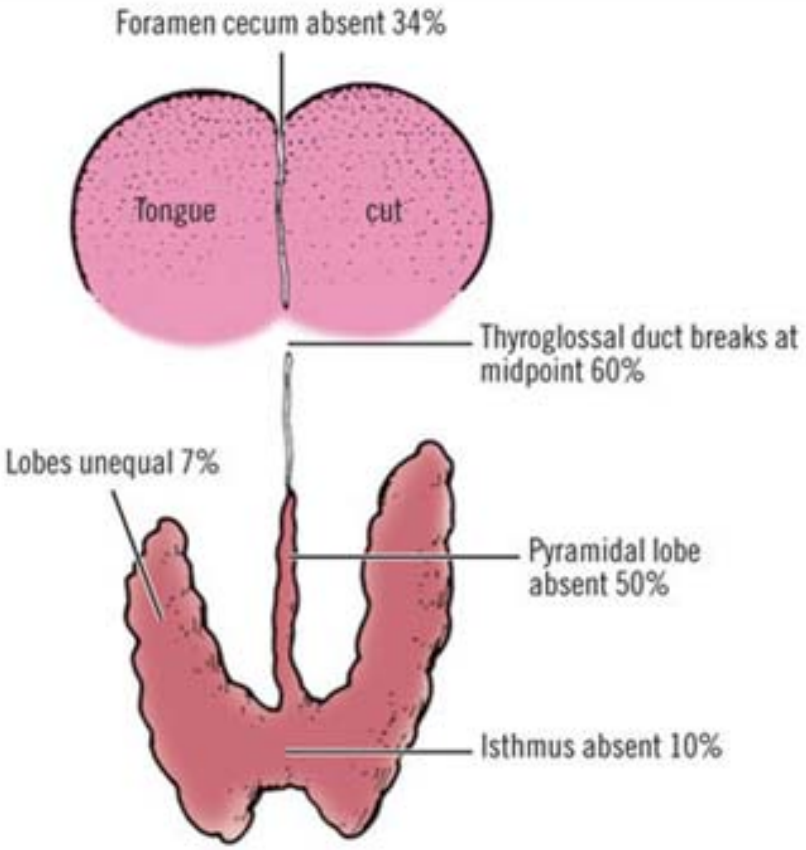
Blood supply of thyroid:

The thyroid gland competes with the adrenal glands for having the greatest blood supply, per gram of tissue. As a result one of the major complications in thyroid surgery is haemostasis. Thyroid is supplied by two paired arteries which are the superior thyroid artery and the inferior thyroid artery. There is an inconsistent midline artery supplying the thyroid known as the thyroid ima artery.

The superior thyroid artery originates from the external carotid artery just above the bifurcation of the common carotid artery. It pierces the pre-tracheal fascia, passes downward and anteriorly and reaches the superior pole of the thyroid gland. The external laryngeal nerve lies immediately behind the artery at its upper part. As it descends down, the nerve separates from the artery to supply the cricothyroid. The superior thyroid artery reaches the upper pole of the gland and divides into two branches- anterior and posterior. The anterior branch of superior thyroid artery anastomoses with the contra lateral artery on the upper surface of isthmus. The posterior branch of superior thyroid artery anastomoses with the ascending branch of inferior thyroid artery on the posterior surface of the gland.

In a study of thyroid glands removed at autopsy from Japanese patients, Nobori et al. observed that an anastomosing vessel from the posterior branch of the superior thyroid artery supplied the superior parathyroid in 45% of cases. The majority of 92 glands (67%) had a single artery of supply; 1/3 had two or more small vessels which entered the gland. In the photographs of the specimens, the branching pattern of the primary vessel supplying the gland appeared to indicate that its origin was from the superior thyroid artery.

The inferior thyroid artery originates from the thyrocervical trunk. It originates directly from the subclavian artery in 15%. The inferior thyroid artery ascends upwards medially behind the carotid artery and the internal jugular vein and loops downward to lower pole. It pierces the prevertebral fascia and divides into two or more branches. Then it crosses the ascending recurrent laryngeal nerve. The recurrent laryngeal nerve has a variable relationship to the artery but is always behind the pre-tracheal fascia. The lowest branch supplies the lower pole of the thyroid gland and also the inferior parathyroids. The upper branch of inferior thyroid artery supplies the posterior surface of the gland, and it anastomoses with the descending branch of the superior thyroid artery.



DEVELOPMENTAL VARIATIONS OF THYROID

The inferior thyroid artery is absent on the right side two percent of the population.The inferior thyroid artery is absent on the left side in five percent of the population.

The thyroid ima artery is unpaired artery and inconstant supply to the parotid. The thyroid ima artery may arise from the brachiocephalic artery or the right common carotid artery or the aortic arch. It occurs in about 10 percent of individuals, according to Montgomery. Size is variable. It lies anterior to trachea. It may be the source of troublesome bleeding in tracheostomy.

Veins draining the thyroid gland form a plexus of vessels which lies in the substance and on the surface of the gland beneath true capsule. Three pair of veins drains this plexus, the superior thyroid vein, the middle thyroid vein and the inferior thyroid veins. The superior thyroid vein accompanies the superior thyroid artery. Thus the upper pole vessels are together. Emerging from the superior pole of the thyroid, the superior thyroid vein passes superiorly and laterally across the omohyoid muscle and the common carotid artery and drain into the internal jugular vein alone or with the common facial vein. The middle thyroid vein arises from the lateral surface of the gland at about two-thirds of its anteroposterior extent. No artery accompanies it. It crosses the common carotid artery to open into the internal jugular vein. This vein may be absent sometimes and occasionally a double vein may be present. The importance of these middle thyroid veins is in their vulnerability during thyroidectomy.The inferior thyroid vein is the largest of the thyroid veins. It is also the most variable of the thyroid veins; the right and left sides are usually asymmetric. The right inferior thyroid vein leaves the lower border of the thyroid gland and passes anterior to the brachiocephalic artery, and drains into the right brachiocephalic vein. The left vein crosses the trachea to drain into the left brachiocephalic vein. Rarely, the right vein may cross the trachea to drain into the left brachiocephalic vein, sometimes forming a common trunk with the left vein. This common trunk is known as the thyroid ima vein.

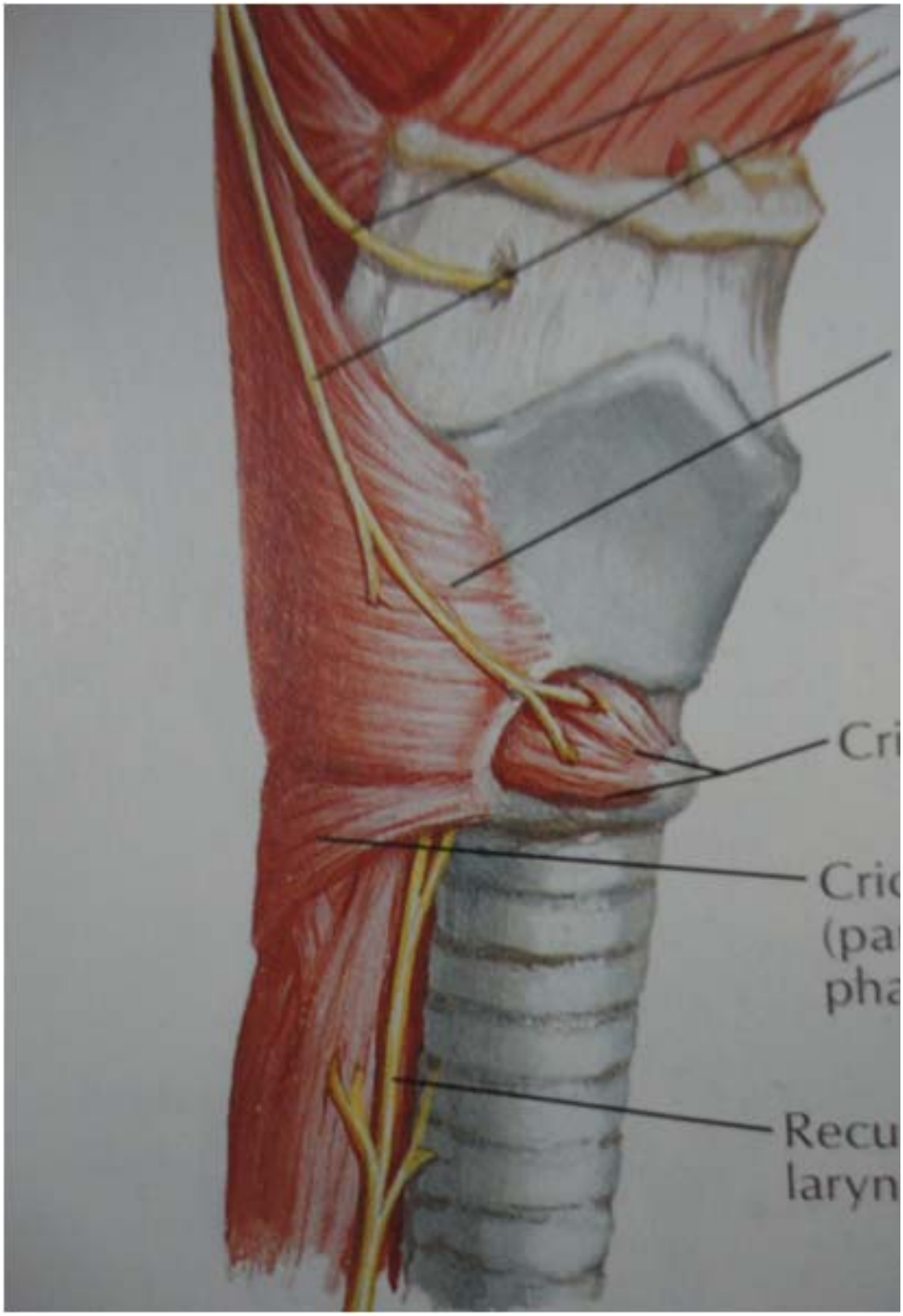
COURSE OF RECURRENT LARYNGEAL NERVE:

Development:

Recurrent laryngeal nerve is a branch of vagus the 10^{th} cranial nerve. Embryologically RLN is the nerve of 6^{th} branchial arches. It arises in relation to the fourth aortic arch vessels. During development these vessels descend down to form the subclavian artery on the right and arch of aorta on the left. The nerve also descends down along with these arteries caudally. Then it hooks around the arteries to run upward to reach their destination in larynx. Thus the course of the nerve differs between the right and left side.

Course in the superior mediastinum:

On the right it arises from the vagus anterior to the first part of the subclavian artery. It then curves backwards below and then behind the artery to ascend obliquely to the side of the trachea behind the common carotid artery. Near the lower pole of the lateral lobe of the thyroid gland it is closely related to the inferior thyroid artery. The recurrent laryngeal nerve crosses either in front of, behind, or between, the branches of inferior thyroid artery.



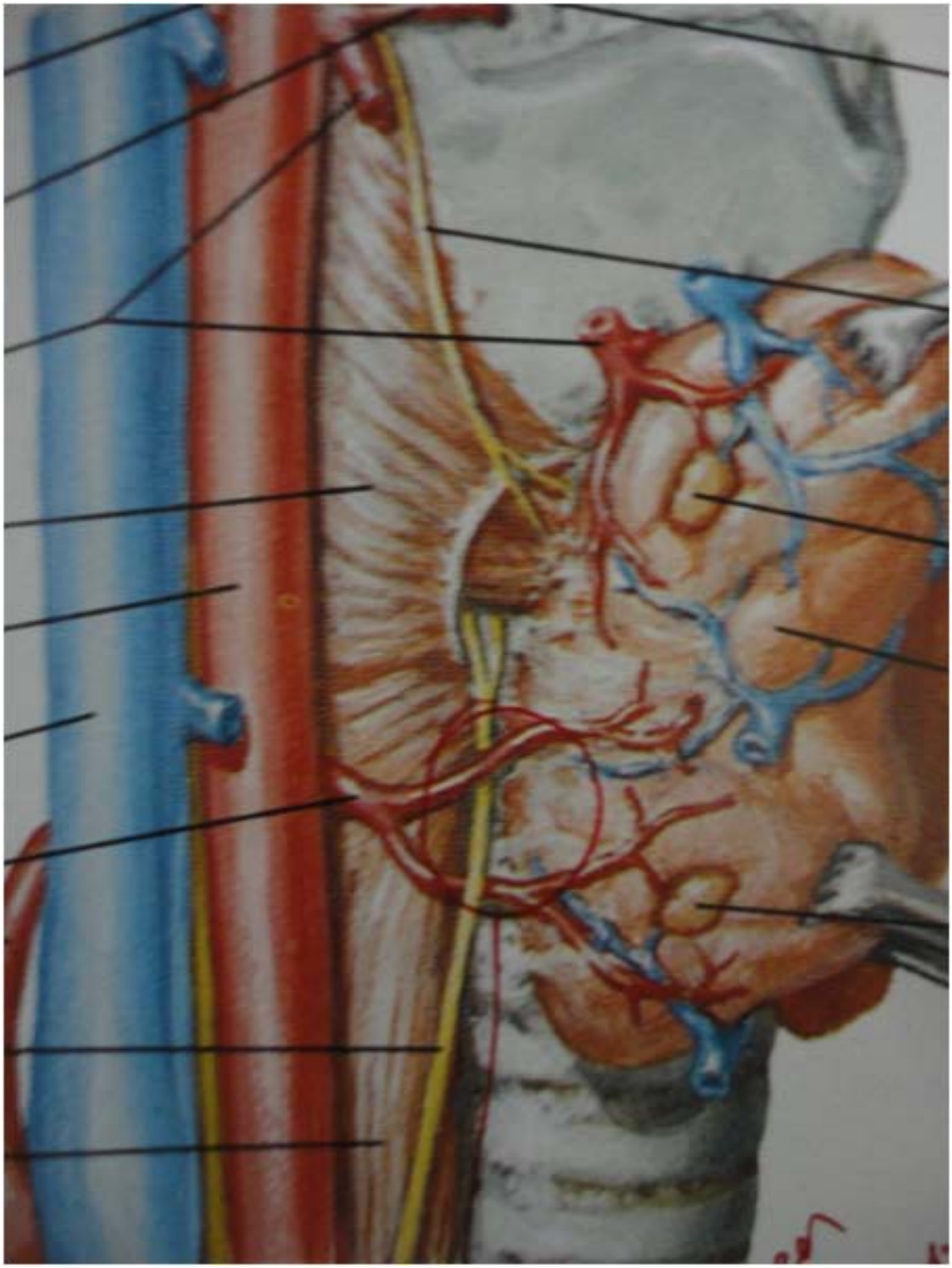
RECURRENT LARYNGEAL NERVE IN TRACHEO-OESOPHAGEAL GROOVE

On the left, the nerve arises from the vagus on the left of the aortic arch. It then curves below it immediately behind the attachment of the ligamentum arteriosum to the concavity of the aortic arch and ascends to the side of the trachea. As the recurrent laryngeal nerve curves round the subclavian artery, or the aortic arch, it gives cardiac filaments to the deep cardiac plexus.

Course in the larynx:

On both sides the recurrent laryngeal nerve ascends in or near a groove between the trachea and oesophagus. It is closely related to the medial surface of the thyroid gland before it passes under the lower border of the inferior constrictor, and it enters the larynx behind the articulation of the inferior thyroid cornu with the cricoid cartilage.

The nerve enters the larynx by passing either deep to (two-thirds of cases) or between (one-third of cases) the fibres of cricopharyngeus at its attachment to the lateral aspect of the cricoid cartilage. It supplies cricopharyngeus as it passes. At this point, the nerve is in intimate proximity to the posteromedial aspect of the thyroid gland.



RELATIONSHIP OF RECURRENT LARYNGEAL NERVE WITH INFERIOR THYROID ARTERY

The recurrent laryngeal nerve does not always lie in a protected position in the tracheo-oesophageal groove, but may be slightly anterior to it (more often on the right), and it may be markedly lateral to the trachea at the level of the lower part of the thyroid gland. On the right the nerve is as often anterior to, or posterior to, or intermingled with, the terminal branches of the inferior thyroid artery. On the left the nerve is usually posterior to the artery, though occasionally it lies anterior to it. The nerve may supply extralaryngeal branches to the larynx which arise before it passes behind the inferior thyroid cornu.

Relation to pre-tracheal fascia:

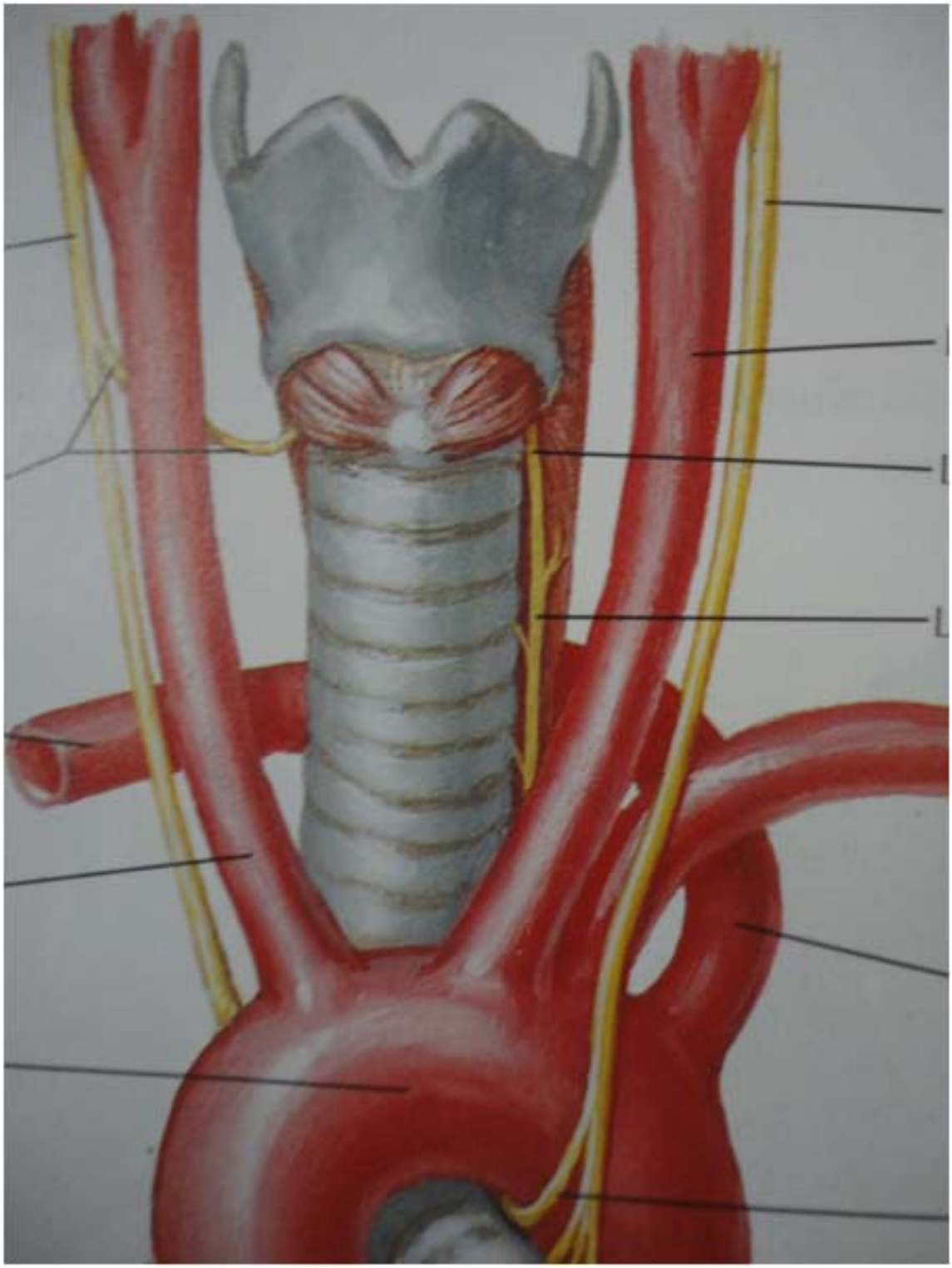
Outside its capsule the thyroid gland has a distinct covering of pretracheal fascia which splits into two layers at the posterior border of the gland. One layer covers the entire medial surface of its lobe; at, or just above, the isthmus it is conspicuously thickened to form the lateral ligament, which attaches the gland to the trachea and the lower part of the cricoid cartilage. The other layer is posterior; it passes behind the oesophagus and pharynx and is attached to the prevertebral fascia .In this way, a compartment is formed on each side of the midline, lateral to the trachea and oesophagus: the recurrent laryngeal nerve and terminal parts of the inferior thyroid artery lie in the fat of this compartment. The nerve may be lateral or medial to the lateral ligament, and sometimes may be embedded in it.

Supply:

The recurrent laryngeal nerve supplies all laryngeal muscles, except the cricothyroid, and it communicates with the internal laryngeal nerve, supplying sensory filaments to the laryngeal mucosa below the vocal folds.

Variation:

An very rare anomaly that is of relevance to laryngeal pathology and surgery is the so-called 'non-recurrent' laryngeal nerve, where the right recurrent laryngeal nerve arises directly from the vagus nerve trunk high up in the neck and enters the larynx close to the inferior pole of the thyroid gland. Only the right side is affected, and it is always associated with an abnormal origin of the right subclavian artery from the aortic arch on the left side. If unrecognized, a non-recurrent laryngeal nerve may be susceptible to injury during surgery. It may also potentially be compressed by small tumours of the thyroid gland.



NON RECURRENT-RECURRENT LARYNGEAL NERVE WITH ANAMOLOUS ORIGIN OF RT SUBCLAVIAN ART

RECURRENT LARYNGEAL NERVE INJURY:

In thyroidectomy right nerve injury is more than left side injury because of its more lateral position on this side and because incidence of non recurrent laryngeal nerve is more on the right side.

In unilateral RLN, the voice becomes husky because the vocal cords do not approximate with one another. Dysphonia starting on the 2nd – 5th post-operative days is commonly due to edema, whereas traction injury of the nerve and damage of axons may result in dysphonia lasting up to 6 months. Dysphonia continuing after 6 months is commonly permanent caused by cutting, ligating or cauterization of the nerve.

Bilateral RLNI is much more serious, because both vocal cords may assume a median or paramedian position and cause airway obstruction and tracheostomy may be required.

LYMPHATIC DRAINAGE:

The chief afferent lymphatic pathways are superior, inferior and lateral; they follow the superior blood vessels, inferior thyroid arteries, and the inferior and the middle thyroid veins. The so-called central compartment nodes are the primary sites of drainage whereas the nodes of the lateral neck (internal jugular, posterior triangle) constitute the zone of secondary drainage. This fact has a significant bearing on the tailored modifications of the neck surgery generally used in treating thyroid malignancies. It is postulated that the metastases to the upper and the submandibular nodes occur in the later stages because of the lymphatic obstruction that occurs with increasing primary tumour size and also when the pretracheal and paratracheal have become obstructed by metastases.14 Lymphatic drainage of the thyroid gland.

Major

Middle jugular nodes: level III

Lower jugular nodes: level IV

Posterior triangle nodes: level V

Lesser

Pretracheal and paratracheal nodes: level VI

Superior mediastinal nodes: level VII

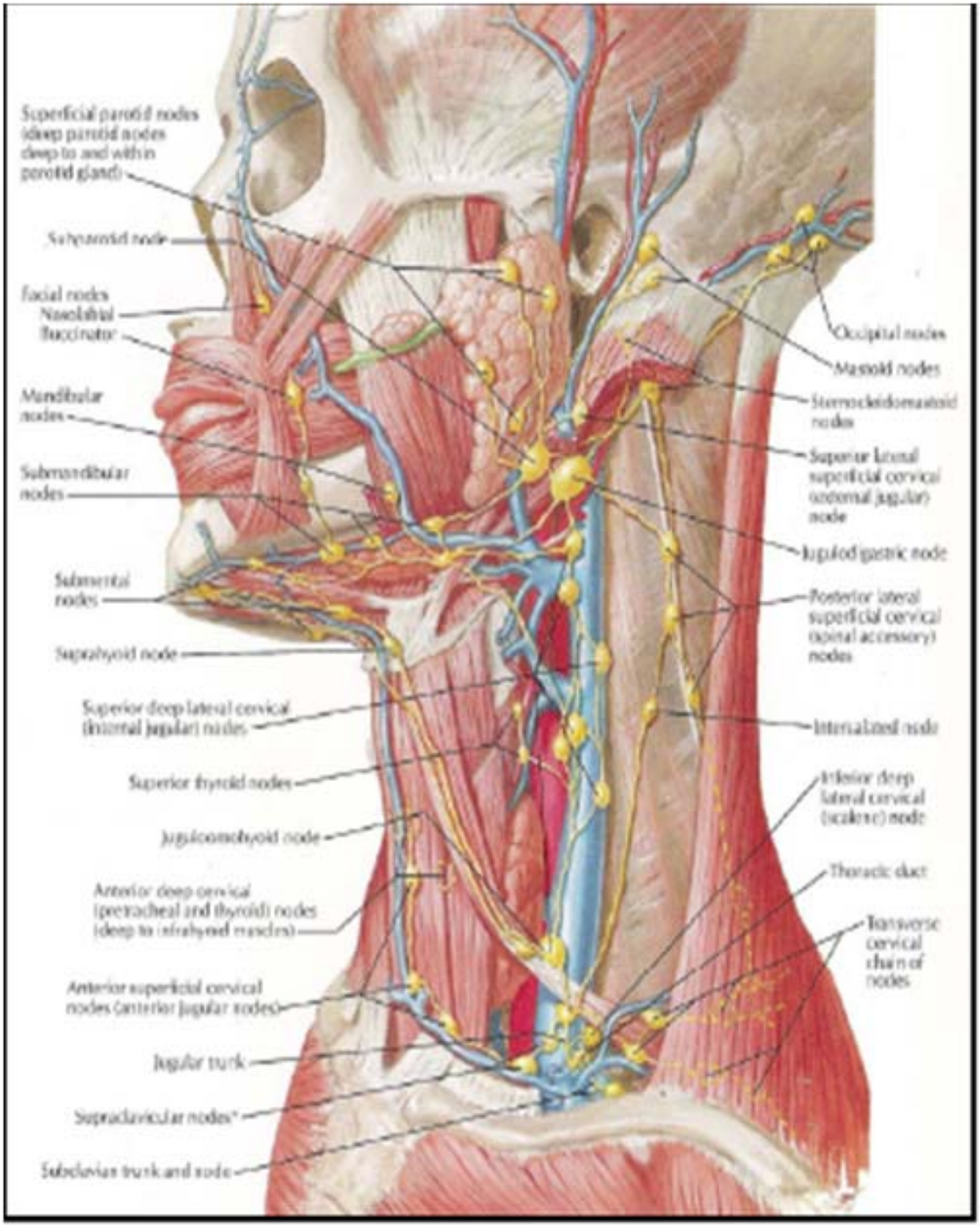


Figure 5: Lymph vessels and nodes of head and neck

HISTORY OF THYROID EVOLUTION: DISEASE AND SURGERY

Recognition of Thyroid Disorders with Goitres:

During the earlier periods neck masses were described by various names like cysts, scrofula and goitre by Galen and Celsus. Abulkasim, in eleventh century, differentiated endemic goitre from non natural goitre. Conservative treatments were tried for goitre by using sea goods like burned sponge. Also, in certain cases, seton implantation and cauterisation were done. It produced inflammation and necrosis of tissues.

Andrea Vesalius used the term *glandulae laryngis* in his anatomy book. Thyroid derives its name from the word *glandulum throideam* which means shield shaped in latin. It was first coined by Thomas Wharton and Albrecht von haller. They attributed the endocrine secretory properties to thyroid.

Earlier Surgical Attempts:

Many attempts were done for surgical removal of thyroid. The indication for surgery was huge neck swelling causing tracheal obstruction and dyspnoea. But the post operative morbidity and mortality were very high due to infection and hemorrhage.

The first recorded attempts at goitre excision dates back to 500ad performed by Abdul Kasan Kelebis. The surgical removal of goitre was first described by Lorenz Heister, a german surgeon. He also described about the colloid substance of thyroid. He emphasised the importance of the endocrine substance. He stated that goitres can become malignant after treatment with acid substances. Bleeding from neck vessels by erosion of arteries by thyroid cancers were recognised by him.

Partial thyroidectomy was first demonstrated by Pierre Joseph Desault at a time when thyroxine was not yet identified. Following this similar procedure was carried out by Johann August and Wilhelm Hedenus for patients who had huge goitre with airway obstruction. Still during this period, thyroid surgery was associated with grave outcomes inspite of good surgical skills.

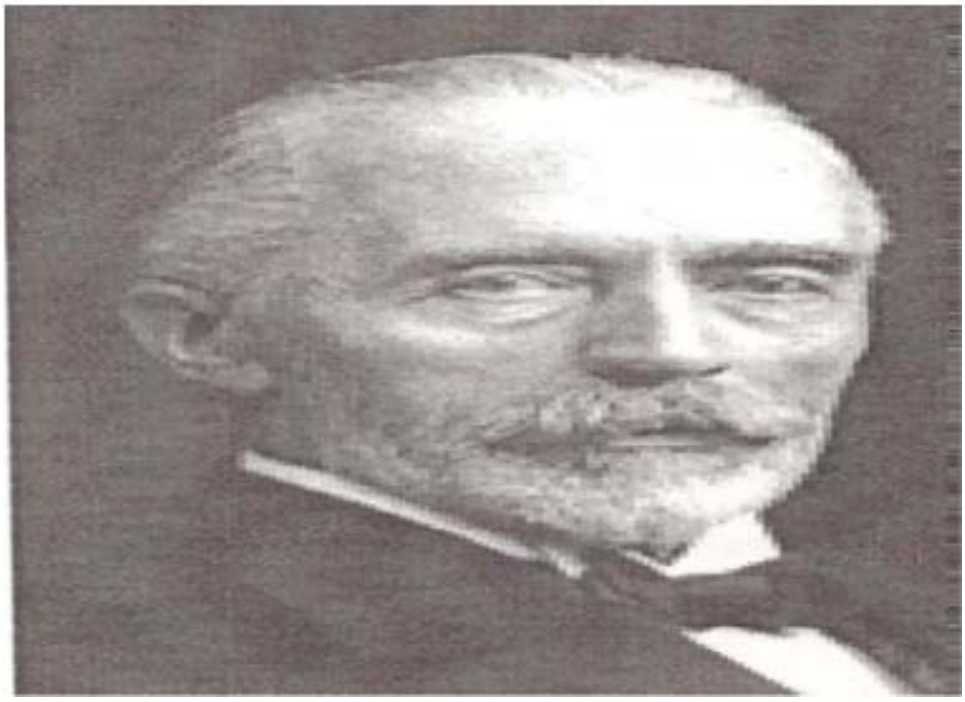
Evolution of Thyroid Surgery in Nineteenth Century:

The major problem during thyroid surgery was uncontrolled bleeding per operatively and post operatively. William Blizzard ligated superior pole arteries as a treatment for hyperthyroidism. Luigi porta did a targeted adenoma excision. He also did a one sided arterial ligation for hyperthyroidism. The surgery failed and he concluded that arteries should be ligated on both sides. Edmund rose

followed this by publishing an article named death by goitre and radical cure of goitres. He reported that for preventing the recurrence of goitre we should do a complete removal of the whole of the thyroid gland. He also stated that all the vessels entering the thyroid should be ligated meticulously at the same time care should be taken not to injure the recurrent laryngeal nerve.

Still the major complications were bleeding and infection. In these time, theodor billroth, a leading surgeon of Europe reported an intra operative mortality of 36%. In the latter half of nineteenth century three important developments made progression of thyroid surgery possible. In 1846 inhalational anaesthesia was first invented by William morton. Next the principles and practise of antisepsis was introduced by joseph lister in 1867. Finally the hemostatic forceps were introduced by Thomas spencer in 1874 for surgery. These three developments greatly helped the surgeons in taking the thyroid surgery one step ahead. These were well ytilised by theodor billroth who did complete thyroidectomy and also achieved hemostasis by ligation of arteries.

Theodor Billroth (1829-1894)



Theodor Kocher (1841-1917)

Theodre kocher is known as the father of thyroid surgery. He performed more than 5000 thyroidectomies during his carrier. He developed a meticulous surgical technique and was very particular about hemostasis. He followed antisepsis strictly. These were evident in his mortality rates which he brought down from 12% to less than 1%. Kocher' technique differed from billroth in that he preserved the strap muscles wereas billroth excised the strap muscles. Also he used a collar incision, now known by his name, while billroth used an oblique and more restrictive incision. After sometime kocher came to know that one of his patients for whom he had done total thyroidectomy at 10 years of age has developed features of infantile hypothyroidism with cretinism. Following this he recalled all the patients for whom he had done total thyroidectomy to see whether they were suffering from hypothyroidism and myxedema. Sixteen patients of the eighteen patients had developed features suggestive of hypothyroidism. He was appalled and resolved never to do a total thyroidectomy for a benign cause. He produced a historic scientific paper describing the adverse effects of total thyroidectomy and also that thyroid has a secretory function.

William Halsted has visited both Kocher's and billroth's clinic as student. He produced an interesting comparative analysis between the two surgeons technique. Most of the Kocher's patient had developed myxedema post

operatively but rarely tetany. Bit in halsted's patient here was more of tetany and less of hypothyroidism. Halsted stated that it was due to different surgical techniques adopted by the two surgeons. Kocher performed surgery in a bloodless operative field meticulously with attention to detail and removal of whole of the thyroid with preservation of surrounding structures. Billroth did a more rapid approach which resulted in parathyroid injury and large retained segments of thyroid.

Thyroid Surgery in Recent Times:

Recent developments in technology have made thyroid surgery much better than in the past. Now thyroid surgeries can be performed with almost nil mortality. The morbidity has been drastically reduced with better understanding of physiology and pathology of thyroid disorders. Infection has disappeared with better antisepsis, aseptic precautions and antibiotics. Bleeding is very rare. The incidence of recurrent laryngeal nerve palsies is 1-5%. The rate of hypothyroidism is less than 1%.

Still more recently minimally invasive approaches have been introduced. And there is intra operative nerve monitoring itself. These require further evaluation and studies to determine the safety and efficacy.

One of the most common surgical procedures in general surgery is thyroidectomy. It is a very safe operation with almost nil mortality. The morbidity is also very low in thyroid surgeries. The complications depend upon the extent of resection and expertise of the surgeon. Every surgeon should have a thorough understanding of the anatomy, its variations and also the pathology of the disease. He should be well trained and should do a meticulous surgery with attention to details. He should have a proper exposure of the operating field and the field should be bloodless.

Preoperative Measures:

In case of hyperthyroid patients, euthyroid status should be attained before surgery. It is imperative that toxicity is controlled preoperatively to prevent post operative thyroid crisis. The patient should be told about the procedure to be done and of its associated complications. Informed consent is obtained from all patients. The skin incision which is to be used in surgery should be marked pre operatively. It should be done in the ward in sitting posture with normal position of the neck with a marker pen. This provides a better cosmesis. The skin incision is curvilinear extending between the anterior borders of the sternocleidomastoids. Care should be taken to avoid too low incision on the neck because it may result in keloid formation. The incision is usually placed two finger breadths above the sterna notch.

STEPS OF THYROIDECTOMY:

A stepwise protocol for surgery is established to prevent any discrepancy in the study. A standard technique of thyroidectomy is described below. In case of difficulties arising in course of surgery , it may be modified as necessary.

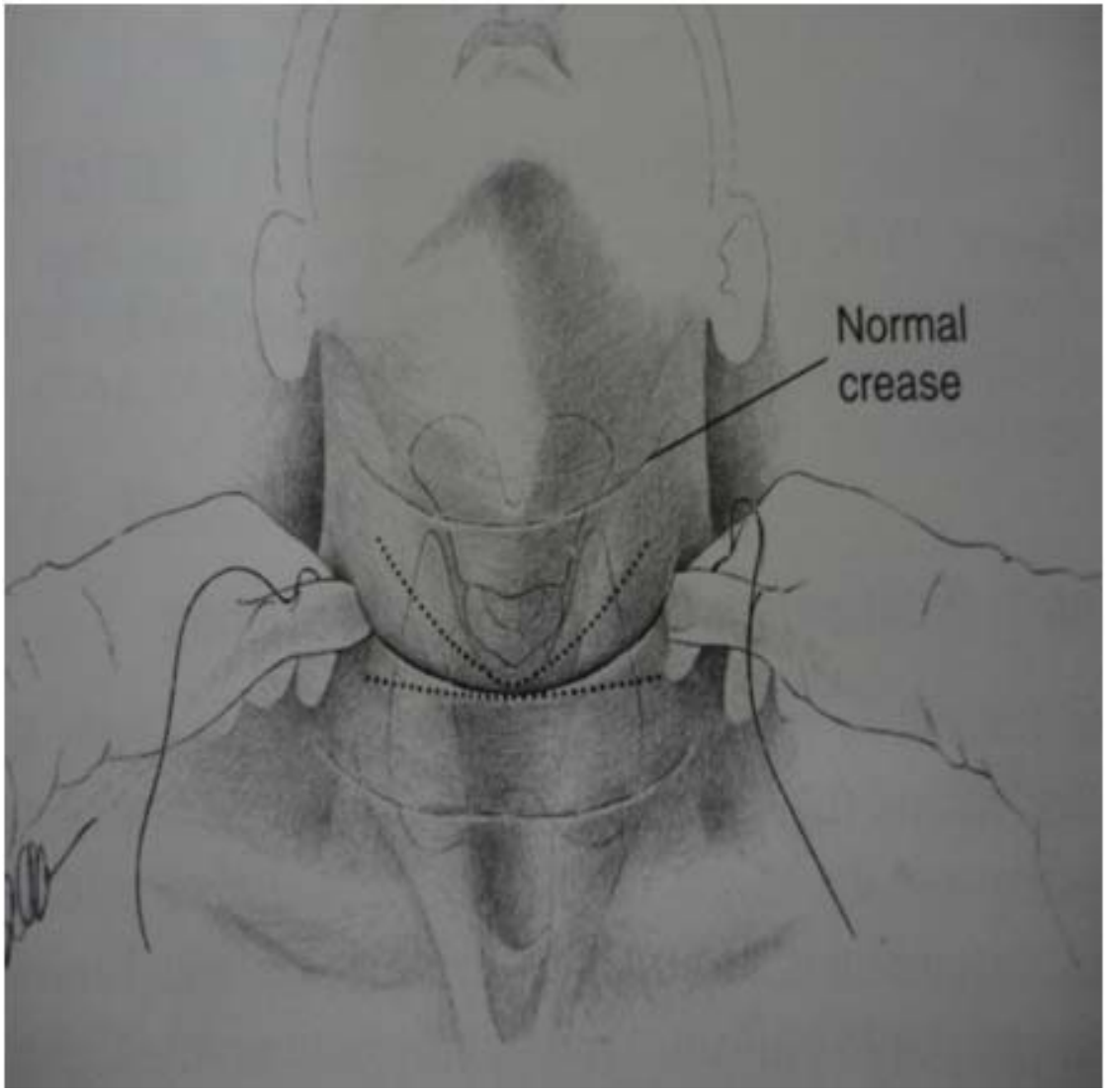
Positioning and Draping:

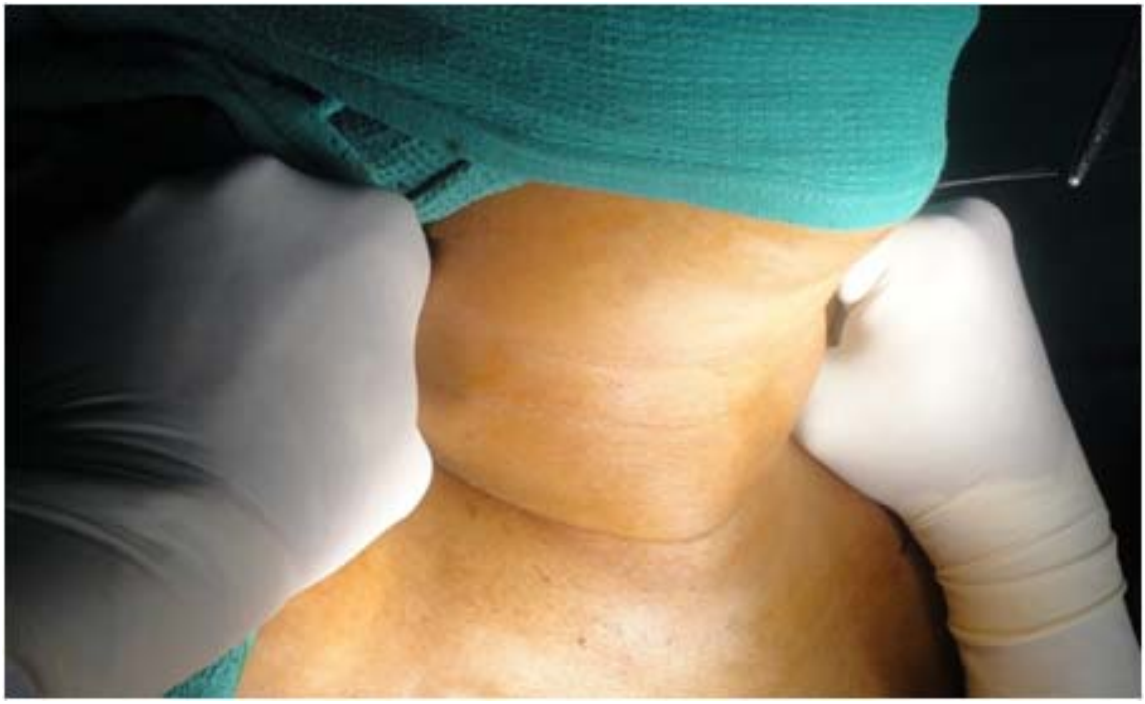
Patient is placed in supine position with extension of the neck. Avoid hyperextension. Extension is achieved by placing a sandbag or folded towel in between the shoulder blades. Head is supported with head ring under the occiput. Head end of the table is elevated 30* to avoid venous congestion. This position will make the thyroid come anteriorly and the strap muscles will be displaced laterally. Painting is done using non iodinated disinfectant. Draping is done using three towel techniques. The first towel is to cover the table second towel is brought to cover the chest. The third towel is to cover the head end. Care should be taken not to apply pressure on the tube during surgery which may result in kinking of the tubes.

POSITION OF PATIENT FOR THYROIDECTOMY

Skin Incision and Creation of Skin Flaps:

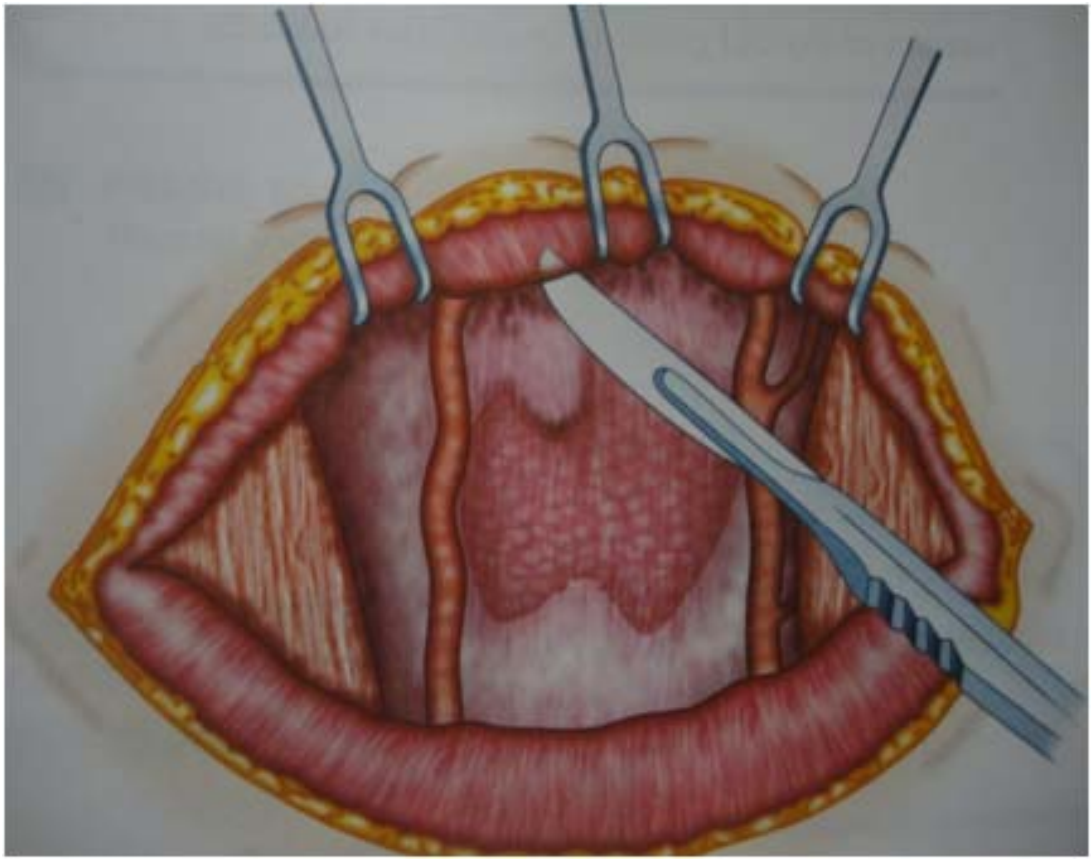
Kochers's curvilinear skin crease incision is made. Nowadays thyroid surgery is a cosmetic surgery so we should take care in planning and marking the incision. If incision is made along the natural skin crease the cosmesis is better. If the incision is not made pre operatively then the proposed line of incision is marked and indented with silk sutures.



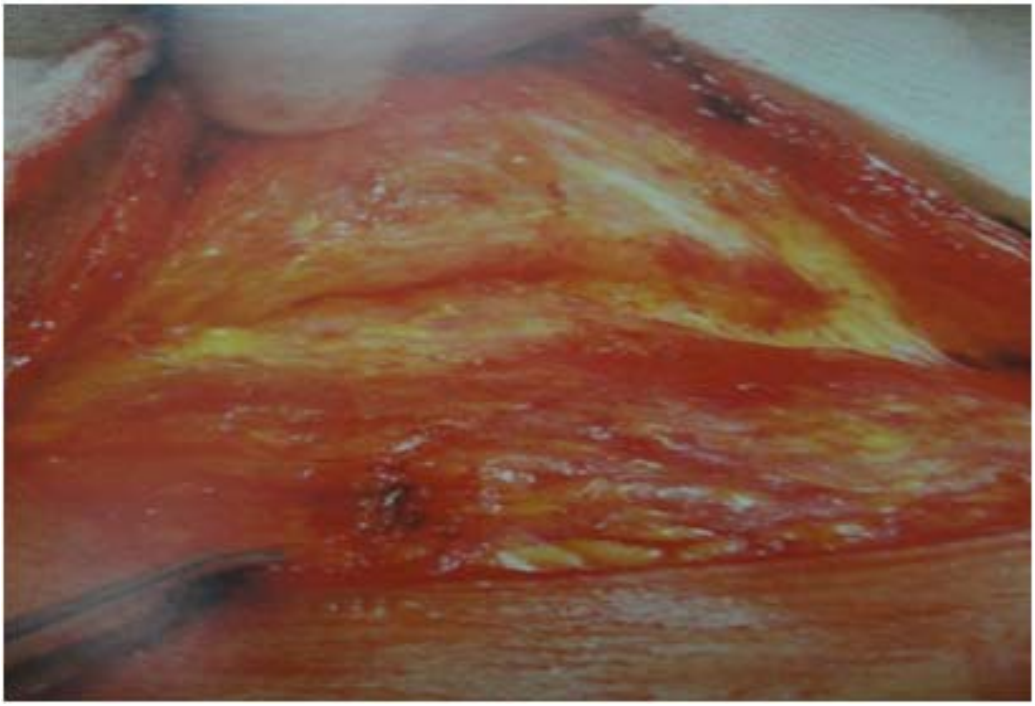


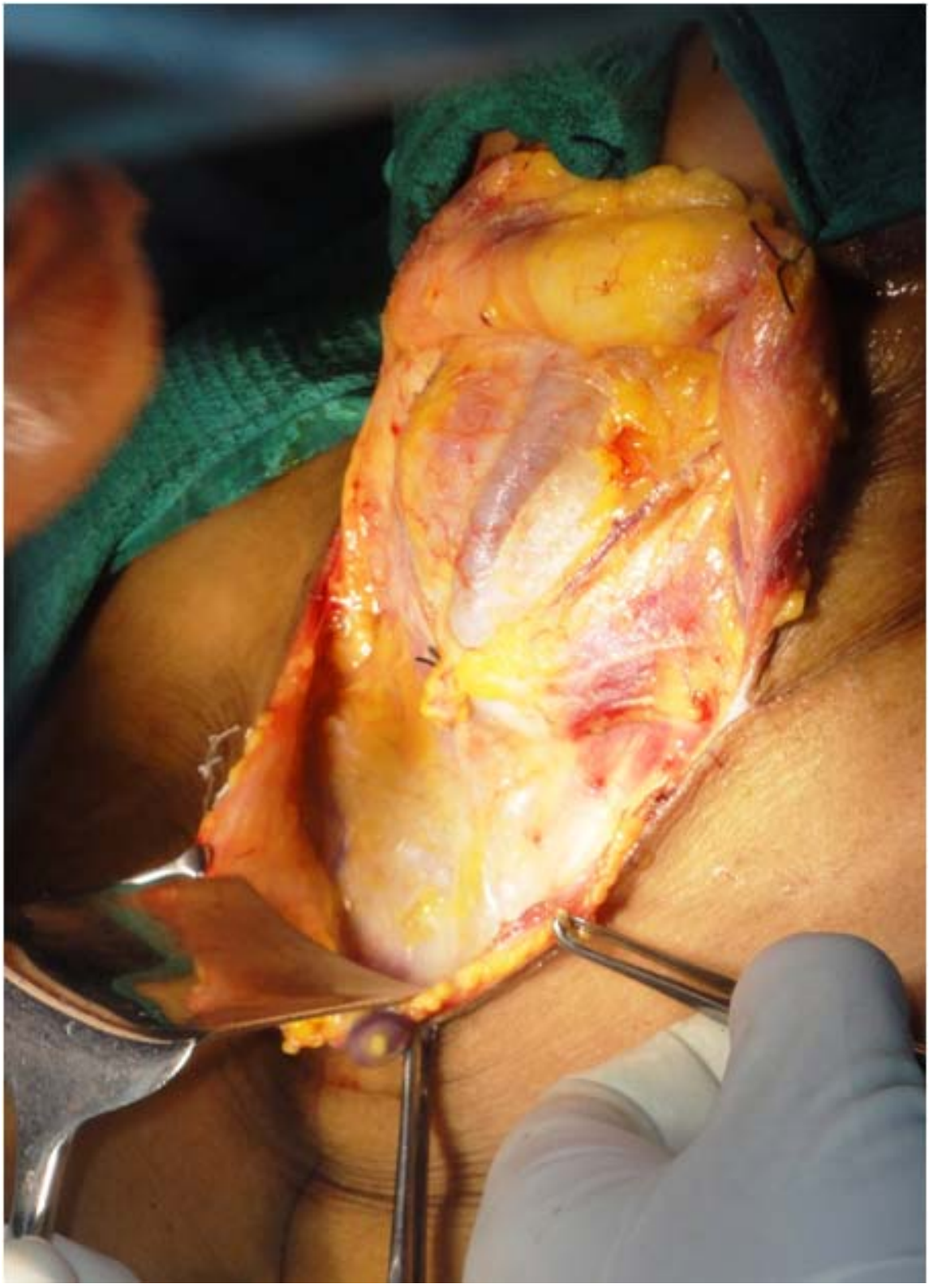
Skin incision is deepened through the subcutaneous tissue. Subcutaneous skin flaps are raised superiorly and inferiorly. The limit of raising the flap is superiorly till the thyroid cartilage and inferiorly till the sterna notch. If the flaps are raised in the sub platysmal plane dissection is blood less. It contains a loose connective tissue which when identified can be swept for raising the flaps. If we miss the plane bleeding may occur from the anterior jugular veins and it may be necessary to tie them. Any bleeding in the subcutaneous level is tied using absorbable sutures. The upper flap may be sutured to the skin of the chin and tied with gauze kept in between to prevent the flap from falling down on the surgical field.

MARKING THE INCISION FOR THYROIDECTOMY-SKIN CREASE INCISION

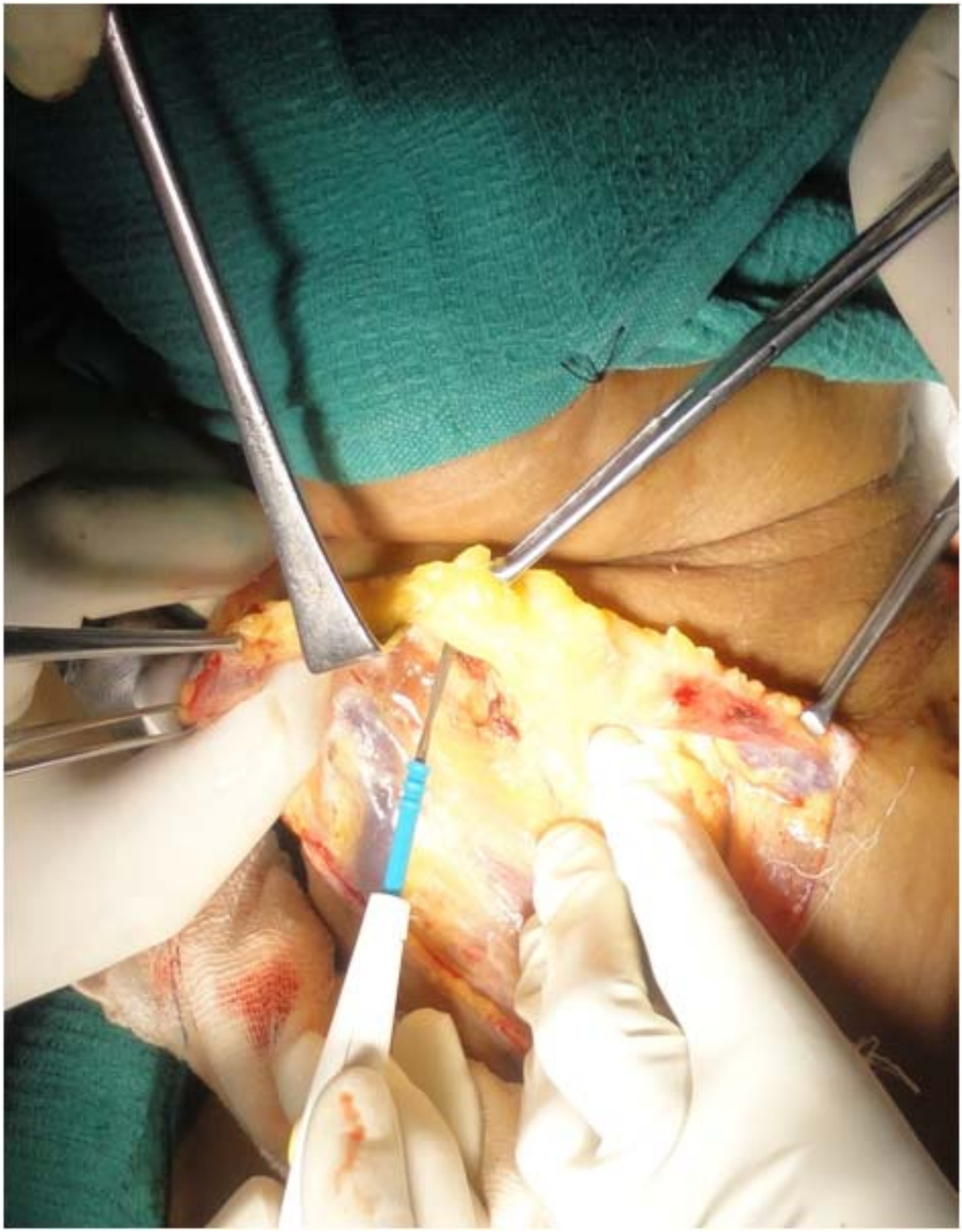


SUB PLATYSMAL FLAP





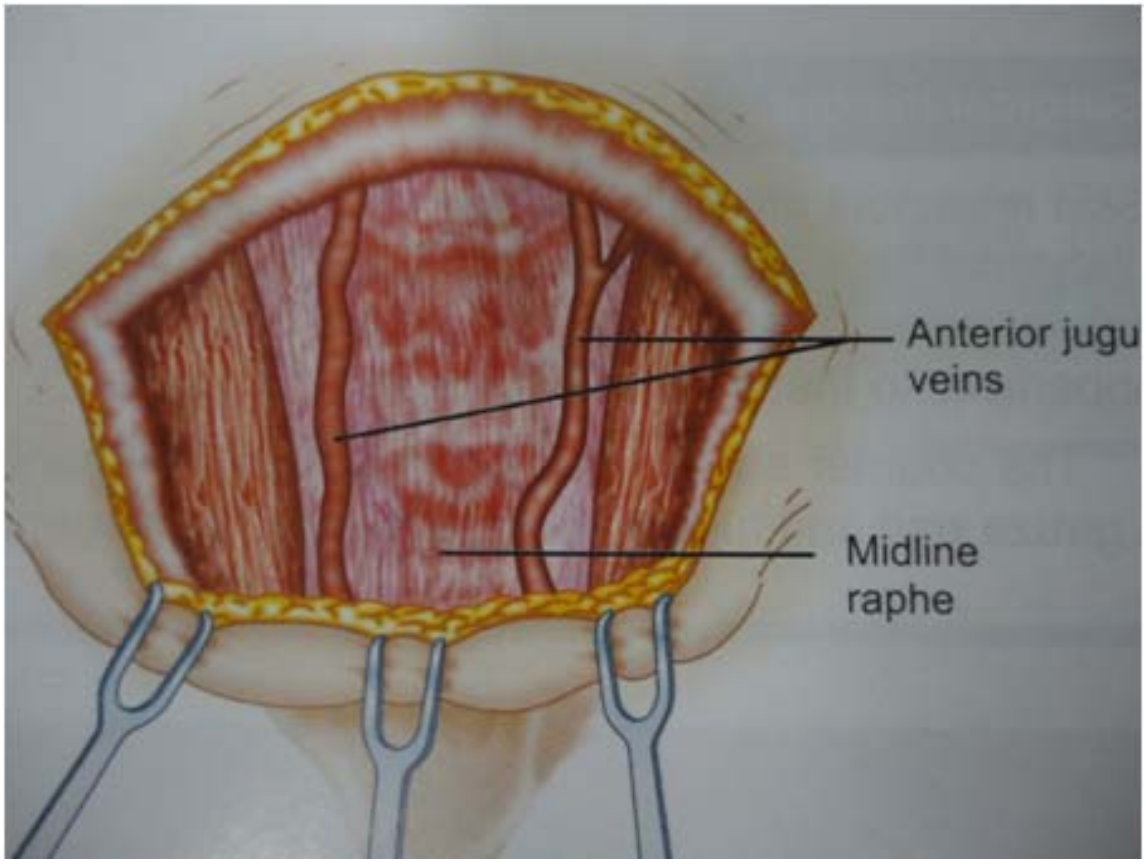
LOWER FLAP

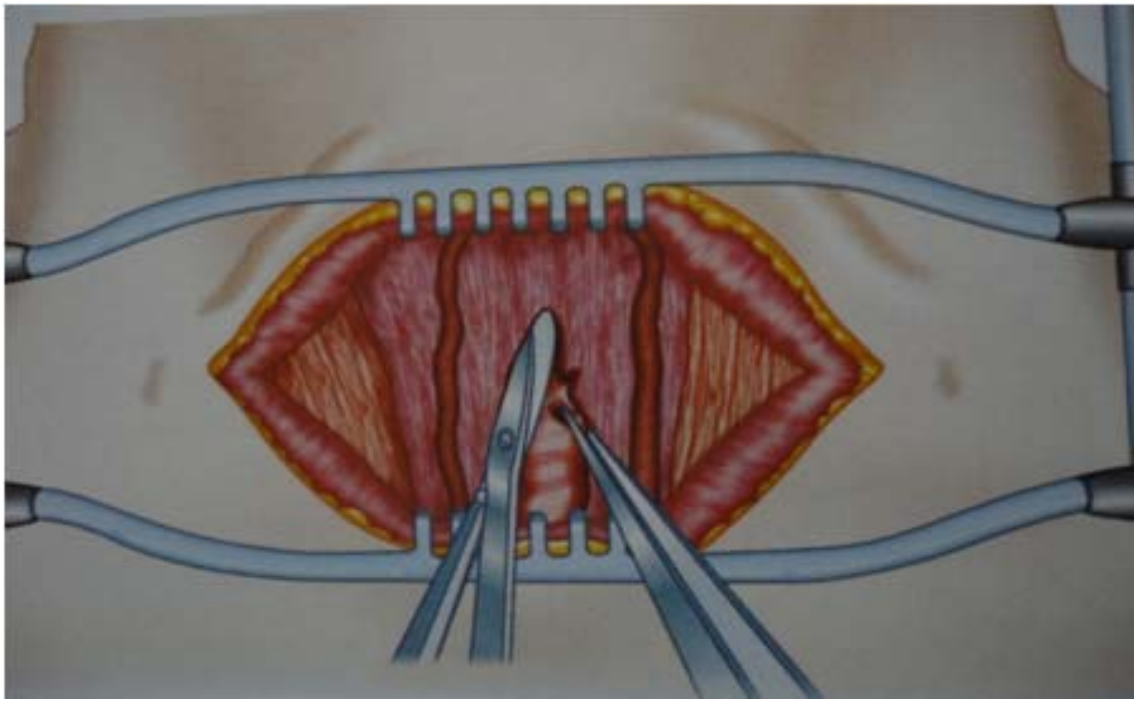


UPPER FLAP

Exposure of thyroid:

Deep cervical fascia is identified by anterior jugular veins running on it. Midline raphe is identified between the sternohyoid muscles. The raphe is divided in an avascular plane from the thyroid cartilage superiorly to the sterna notch inferiorly. Sternohyoid muscles which meet in the midline are separated to expose the isthmus of thyroid gland and tracheal rings. Sternothyroid muscles which do not meet in the midline and lie in a deeper and lateral position are separated of the thyroid gland to expose lateral aspect. The separation of muscles is done using peanut pusher. If any bleeding occurs it should be held by dissection forceps and cauterised.

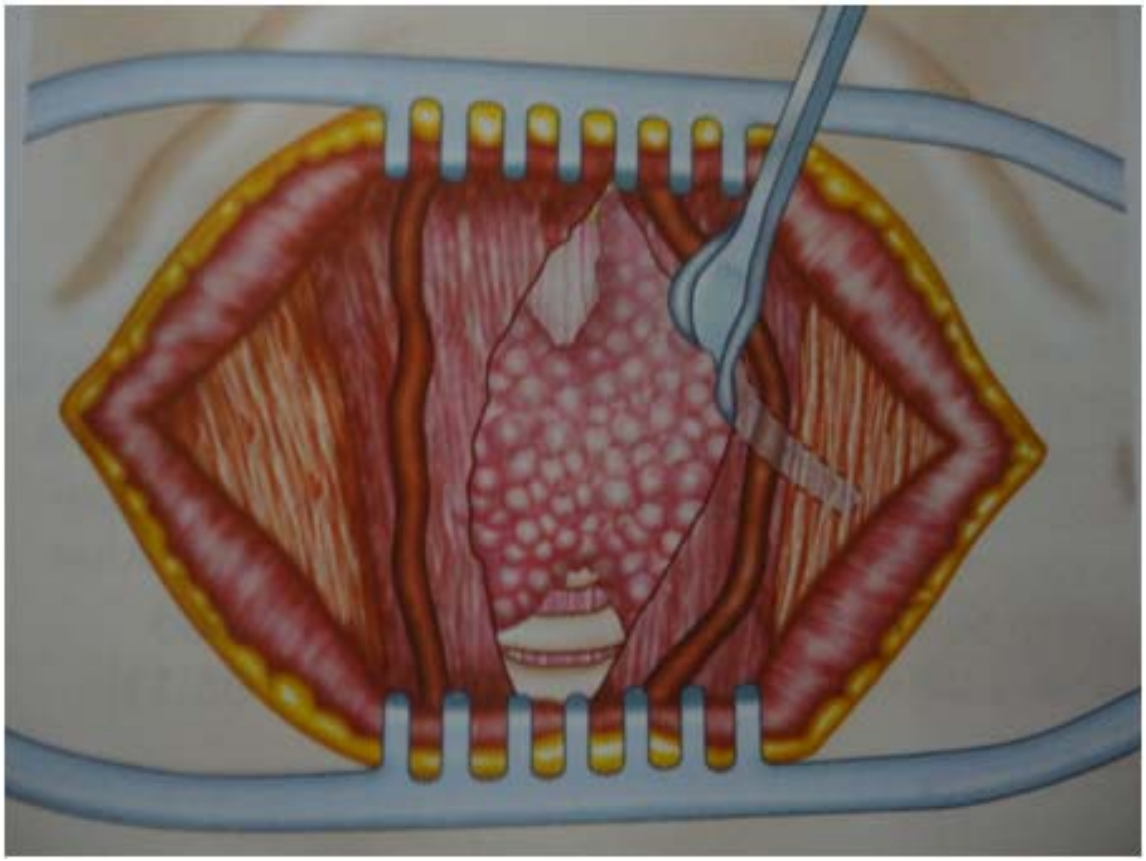




OPENING THE MIDLINE RAPHE

DIVISION OF STRAP MUSCLES:

In case of large thyroid dissection of upper pole will be difficult. It may be required to divide the strap muscles. The strap muscles should be divided at the upper part near because the nerve supply to the strap muscles from ansa cervicalis is at the lower part of the muscle. The divided strap muscles should be re-sutured at the end of the procedure. The strap muscles are held apart by de Quervain retractors for good exposure of lateral surface of thyroid gland.



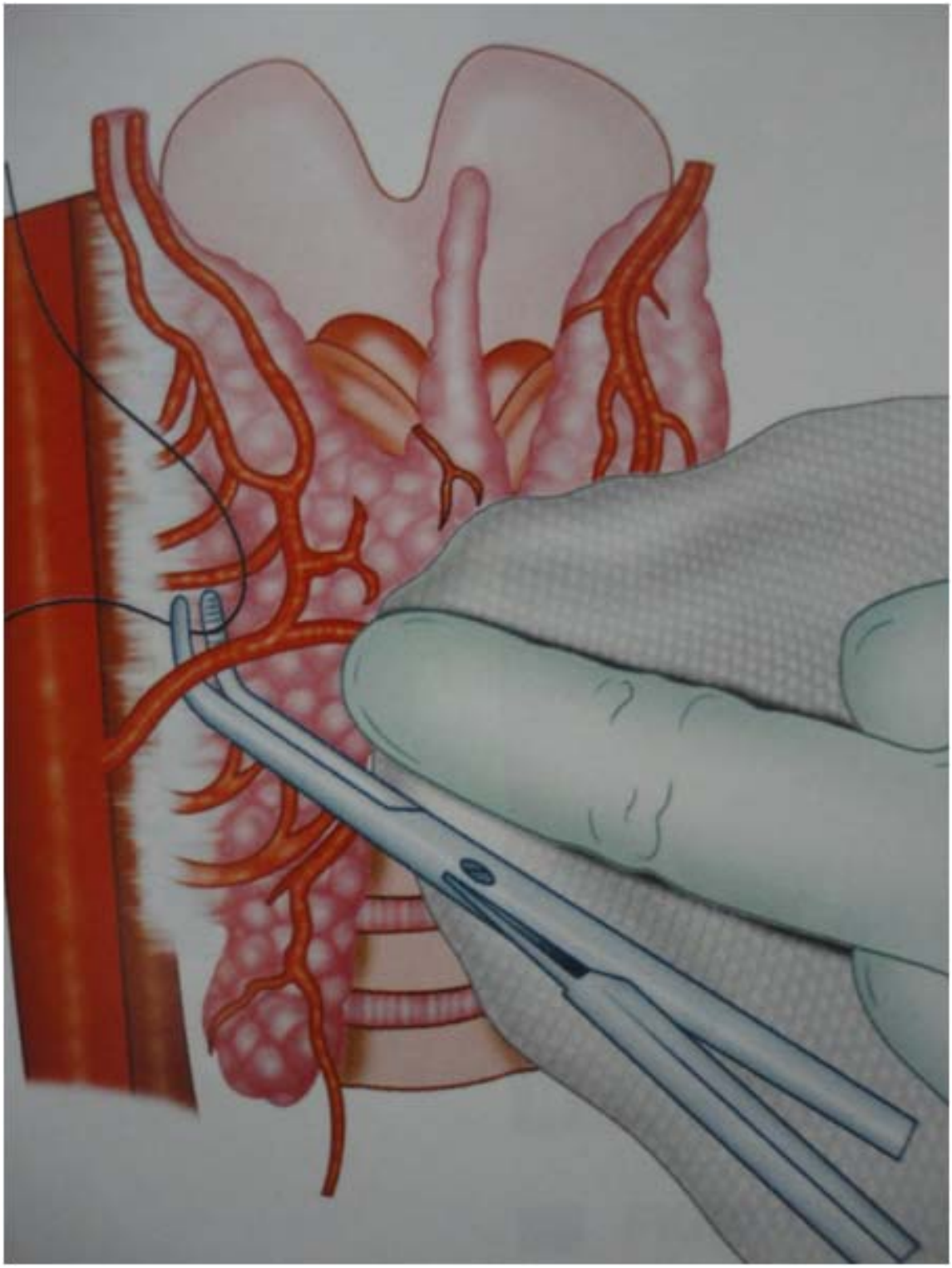
RETRACTION OF STRAP MUSCLES

PLANE OF DISSECTION:

The thyroid is dissected between its true and false capsule. This plane is a relatively avascular plane. The venous plexus of the thyroid lies beneath the true capsule which is not opened.

MIDDLE THYROID VEIN:

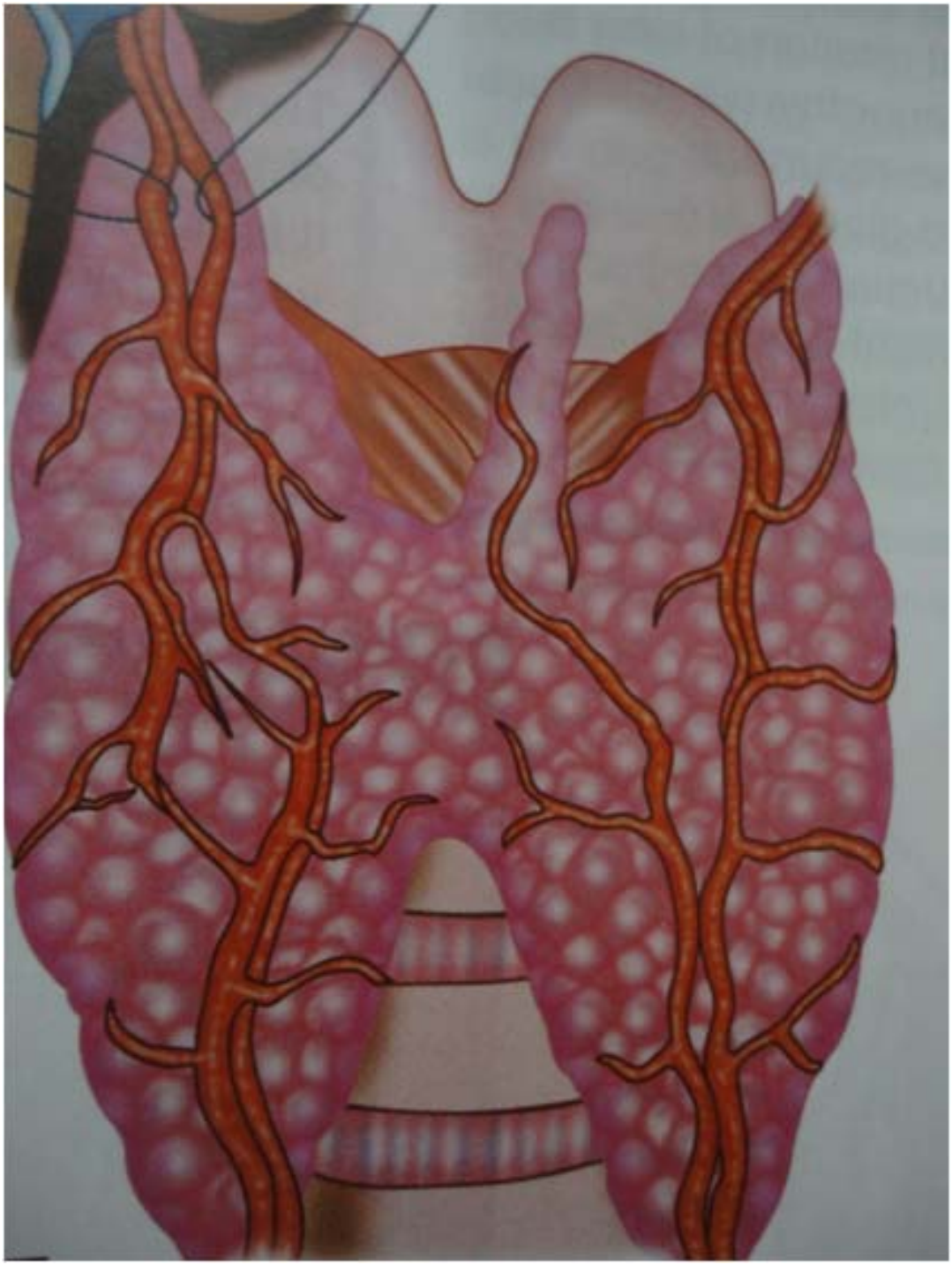
After retracting the strap muscles the thyroid is hooked out and brought anteriorly in to the open surgical field. The middle thyroid vein which comes out from the lateral surface of the thyroid should be identified first and ligated in continuity using silk sutures. The middle thyroid vein is a flimsy structure which could be easily torn during mobilisation of the thyroid and cause troublesome bleeding. So, it should be always ligated first.



LIGATION OF MIDDLE THYROID VEIN IN CONTUINITY

DISSECTION OF SUPERIOR POLE:

The thyroid is held with the right hand and traction applied inferiorly and medially to make the superior pole more prominent. Using a blunt tipped right angled instrument the superior pole containing the superior thyroid vessels is hooked out by blunt dissection, as close to the gland as possible. Usually the superior laryngeal nerve is not seen as it is well away from the arteries at the upper pole of the gland. After hooking out the artery and veins are separated using fine tipped instrument and ligated individually. There is theoretical risk of arterio-venous fistula formation if the artery and vein are ligated as a whole. The arteries should be double ligated proximally. After ligation, the artery is cut using knife with support below using the right angled instrument.



LIGATION OF SUPERIOR POLE OF THYROID- ARTERY AND VEIN LIGATED SEPERATELY CLOSE TO THE SUPERIOR POLE

DISSECTION OF LOWER POLE AND RECURRENT LARYNGEAL NERVE:

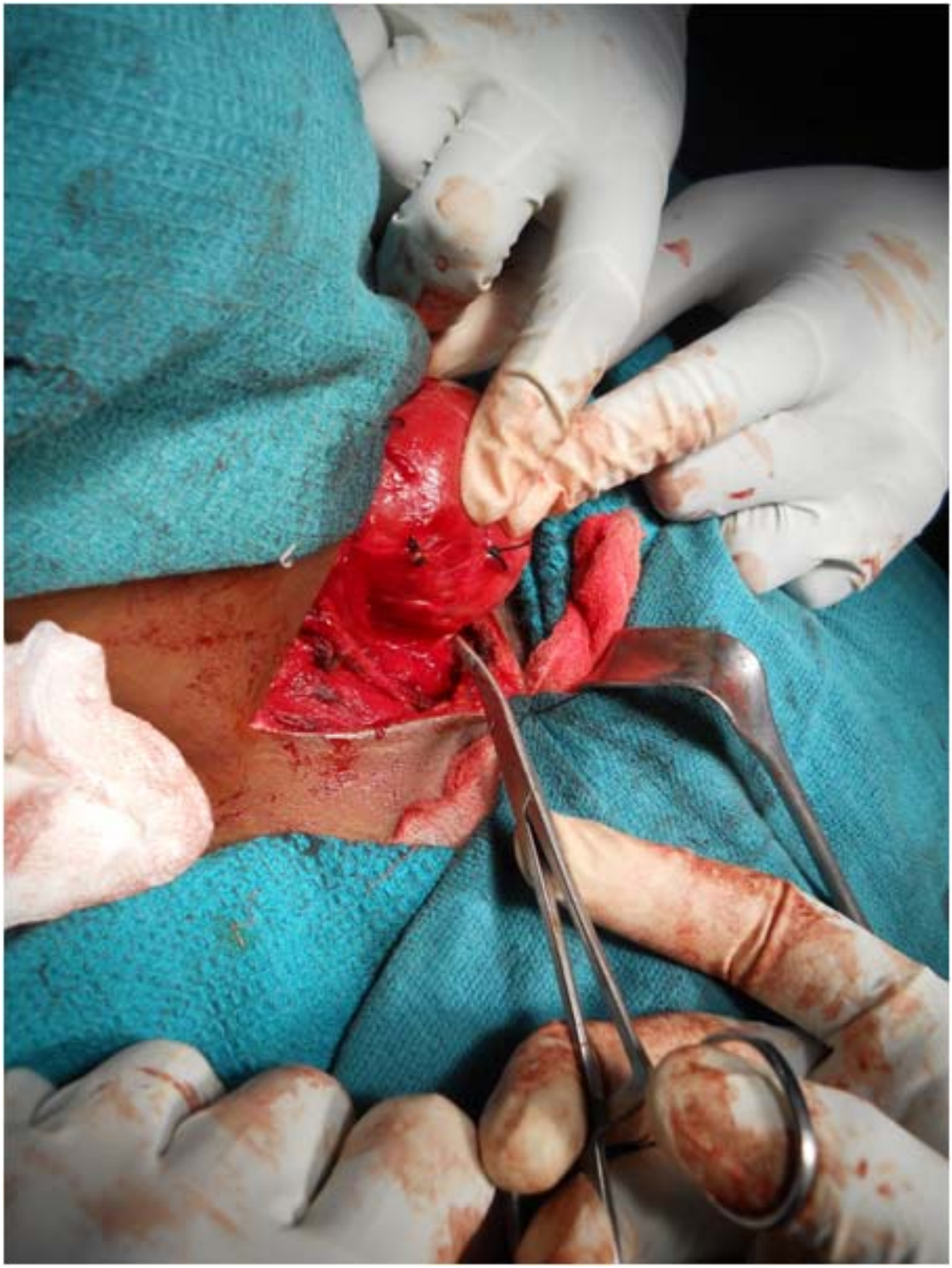
Once the upper pole is completely mobilized by ligation of the vessels we will be able to rotate the gland medially and bring it anteriorly. By doing this step the lower pole is adequately visualised. The recurrent laryngeal nerve can be identified by two methods. In inferior to superior dissection method, the nerve is identified low down in the neck where it crosses the inferior thyroid artery. The position of nerve at this point is variable and differs on both sides.

The nerve lies behind the pre tracheal fascia at this point and care should be taken not to disturb this fascia. If the nerve can be traced without disturbing this fascia no harm will be done. The nerve is traced to the point where it enters the larynx posterior to the cricothyroid muscle. Care should be taken to avoid devascularizing the parathyroids. The left nerve will be in the trachea-oesophageal groove and placed medially whereas the right nerve will be oblique and situated more laterally.

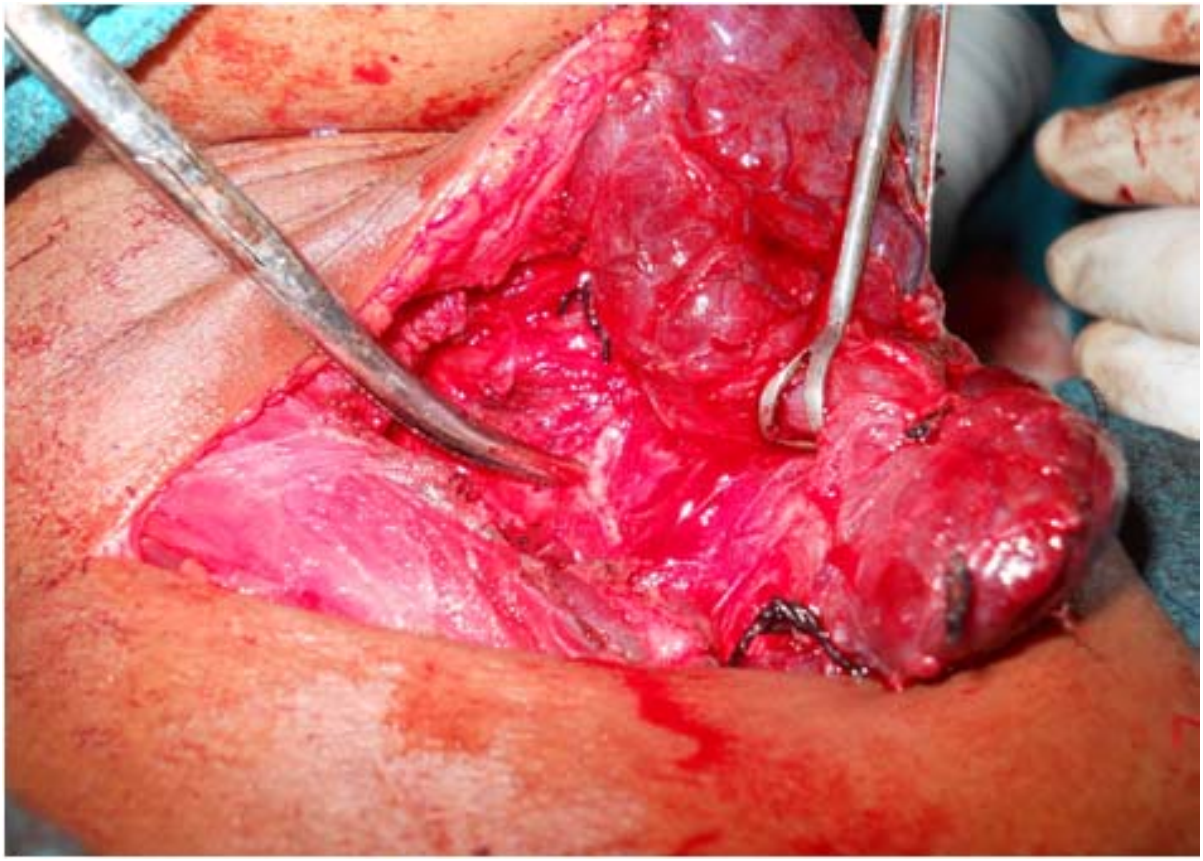
In superior to inferior method, anteromedial tension is applied on the thyroid and counter traction applied by retracting carotid sheath laterally. This places tension on the inferior thyroid artery and helps to expose the recurrent

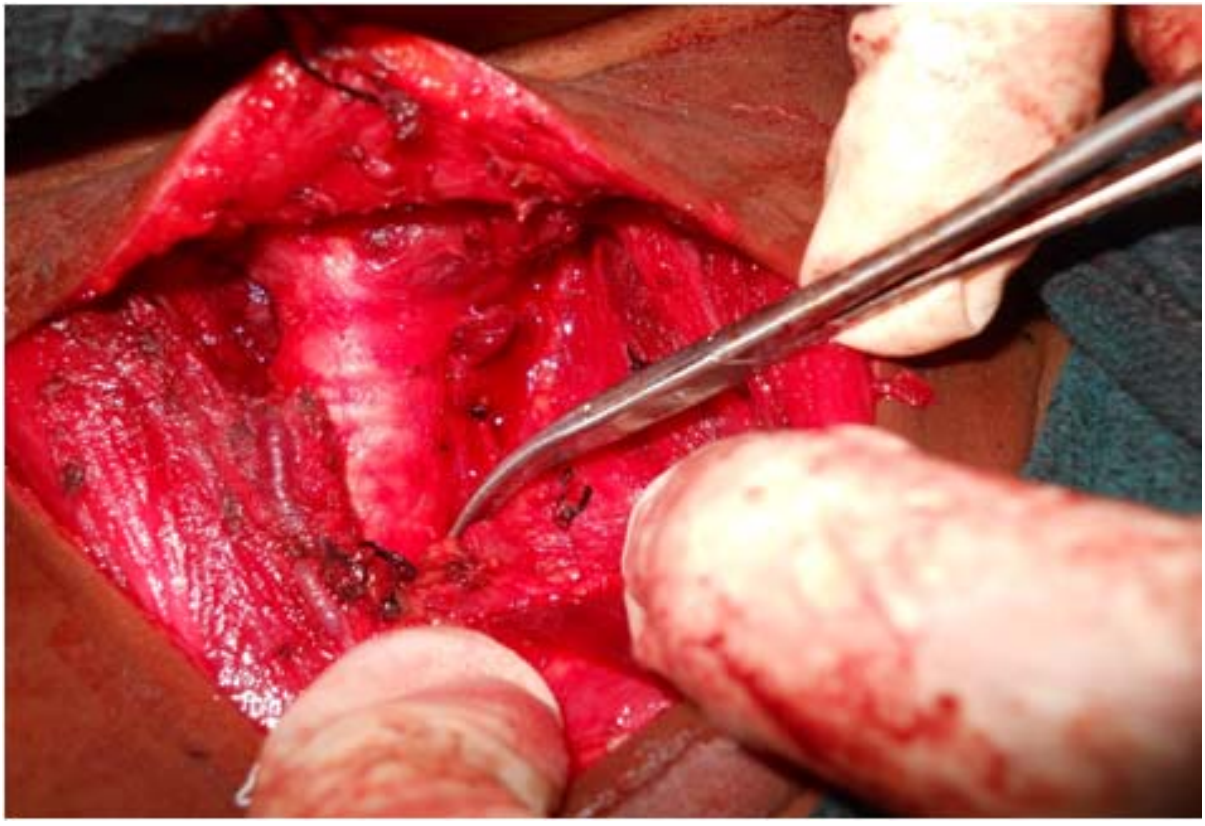
laryngeal nerve and parathyroid gland. The nerve is found at the level of cricoid cartilage where the recurrent laryngeal nerve enters the larynx posterior to the cricothyroid muscle. The RLN is identified laterodorsally to the ligament of Berry. The recurrent laryngeal nerve has a characteristic white colour that helps in differentiation from surrounding structures. A blood vessel running along the surface of the nerve, vasa nervosum, is also a characteristic operative finding.

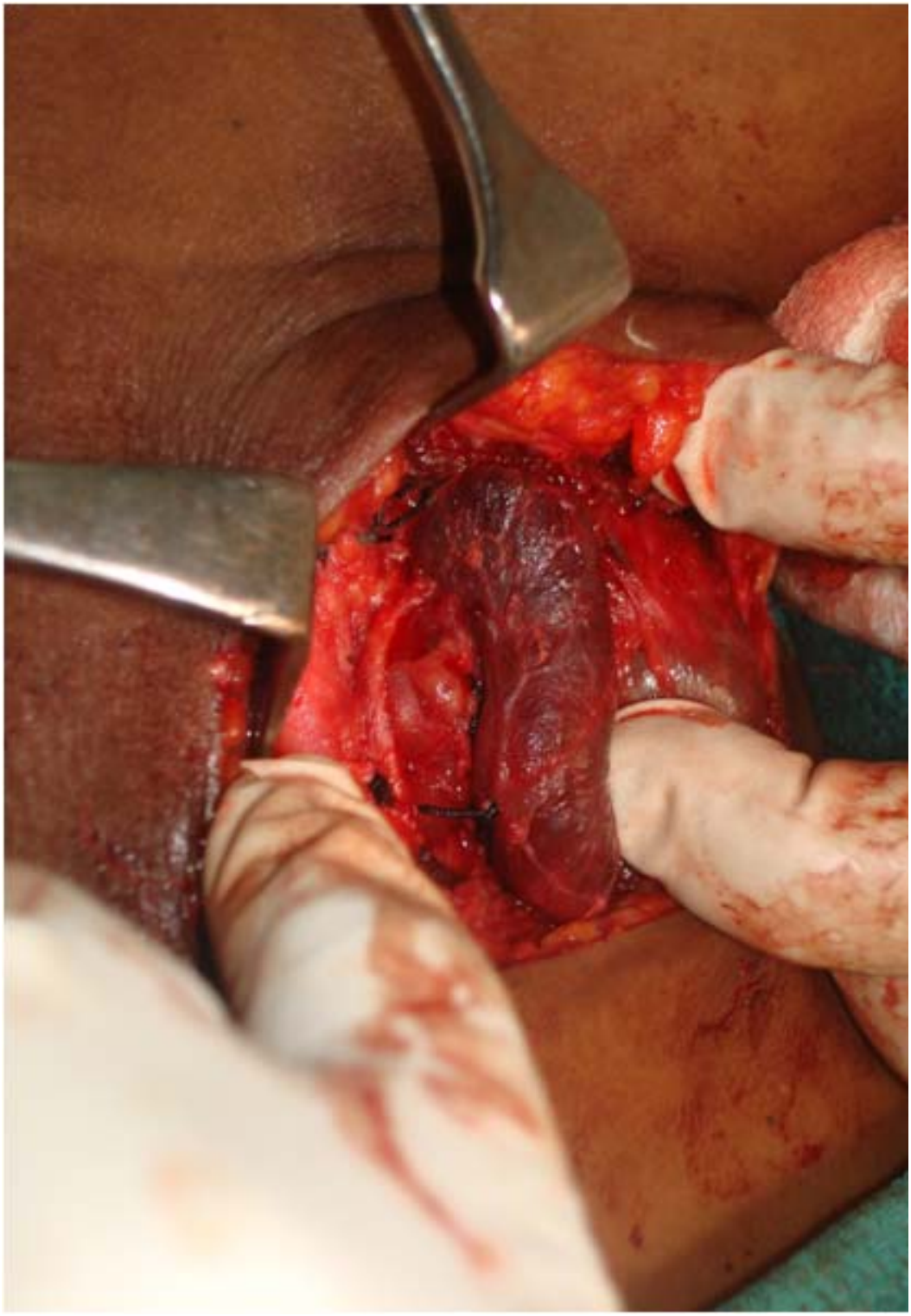
The nerve can also be identified at its constant location, the Zuckerkandl tuberculum, where it crosses beneath the thyroid gland and enters below Berry's ligament of the thyroid cartilage. Tubercle of zuckerkandl is a lateral thickening and projection of thyroid lobe representing the site at which the ultimobranchial body fuses with the principal median thyroid process.

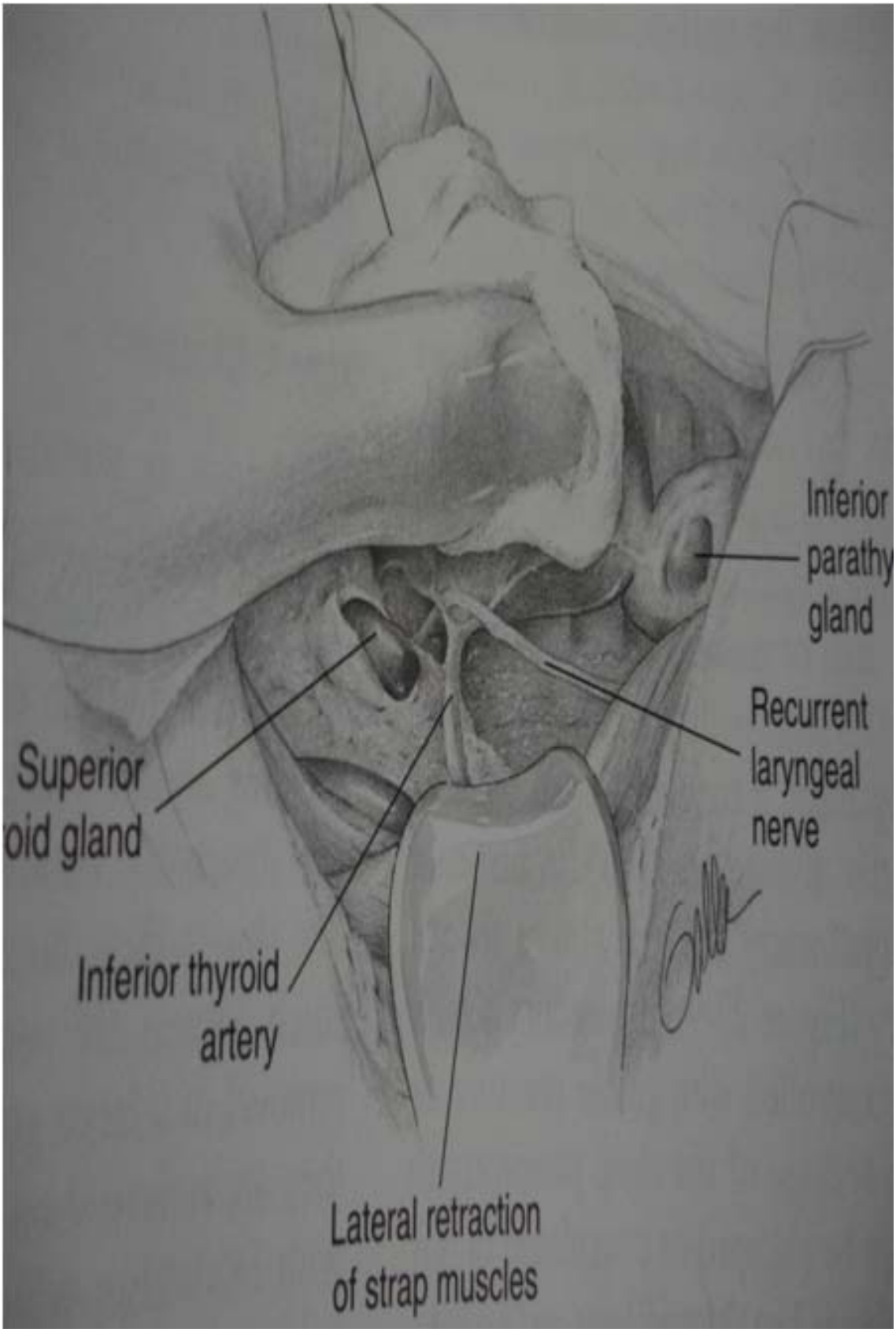


RECUURRENT LARYNGEAL NERVE



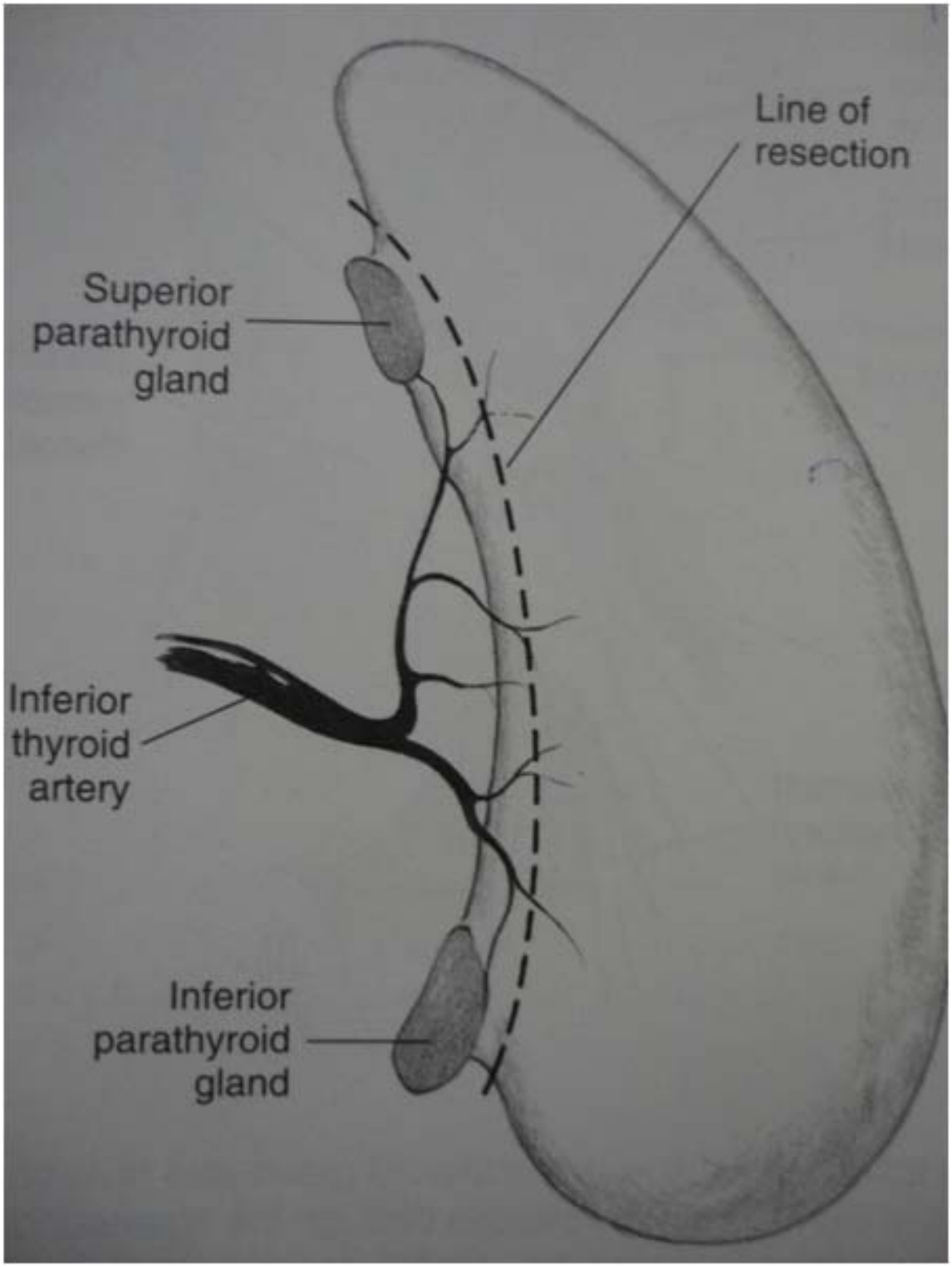





Inferior
parathy
gland
Recurrent
laryngeal
nerve
Superior
oid gland
Inferior thyroid
artery
Lateral retraction
of strap muscles

CAPSULAR DISSECTION:

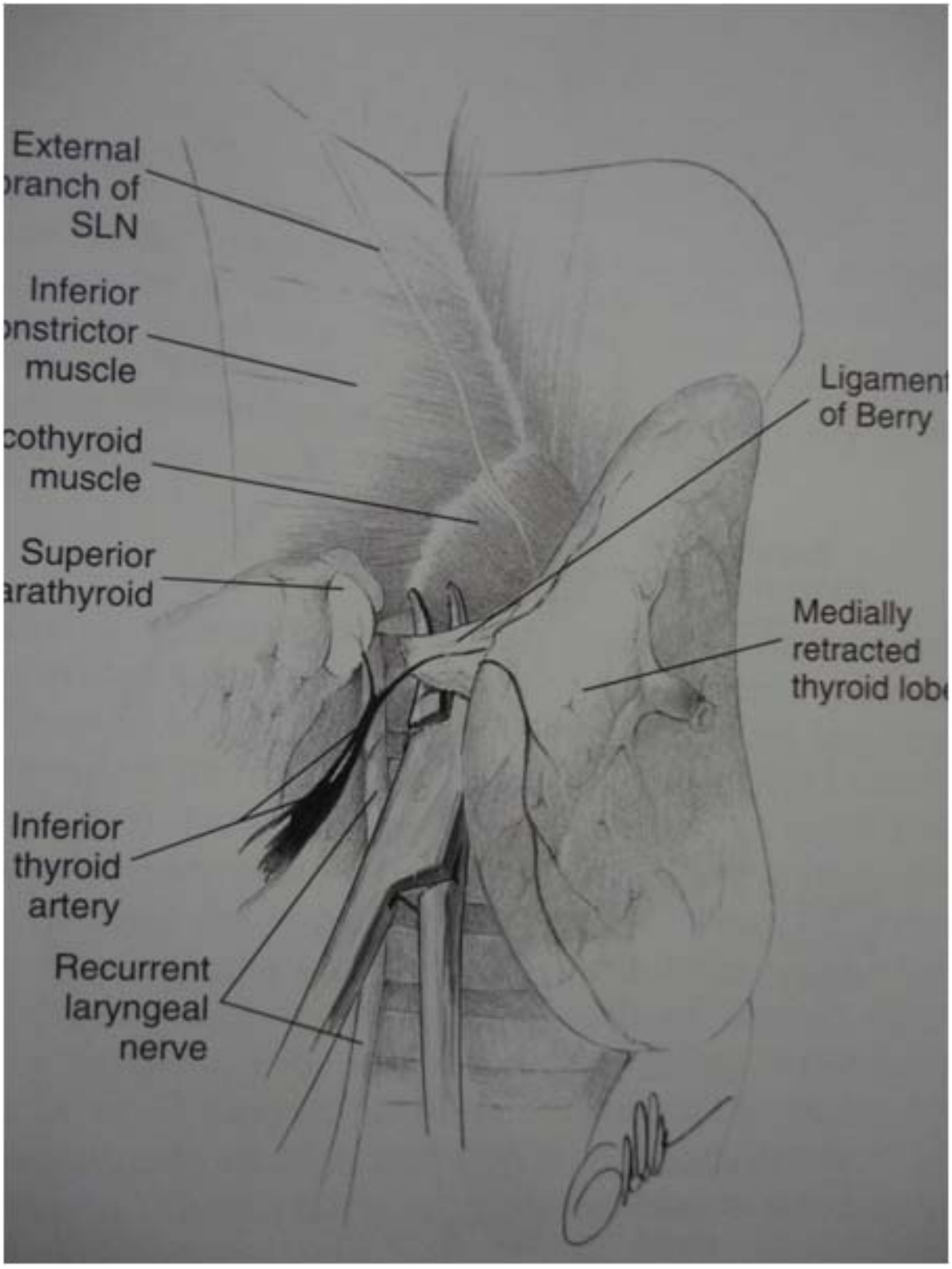
Capsular dissection is a technique of dissection of thyroid where ligation of arteries is done as close to the gland as possible, on the thyroid capsule itself. A plane is created between the terminal branches of inferior thyroid artery and the true capsule of the gland. The arteries are ligated individually on the surface of the gland as they enter the capsule in to the substance of the gland. This helps to preserve the vasculature of the parathyroids. It literally means hugging the thyroid.



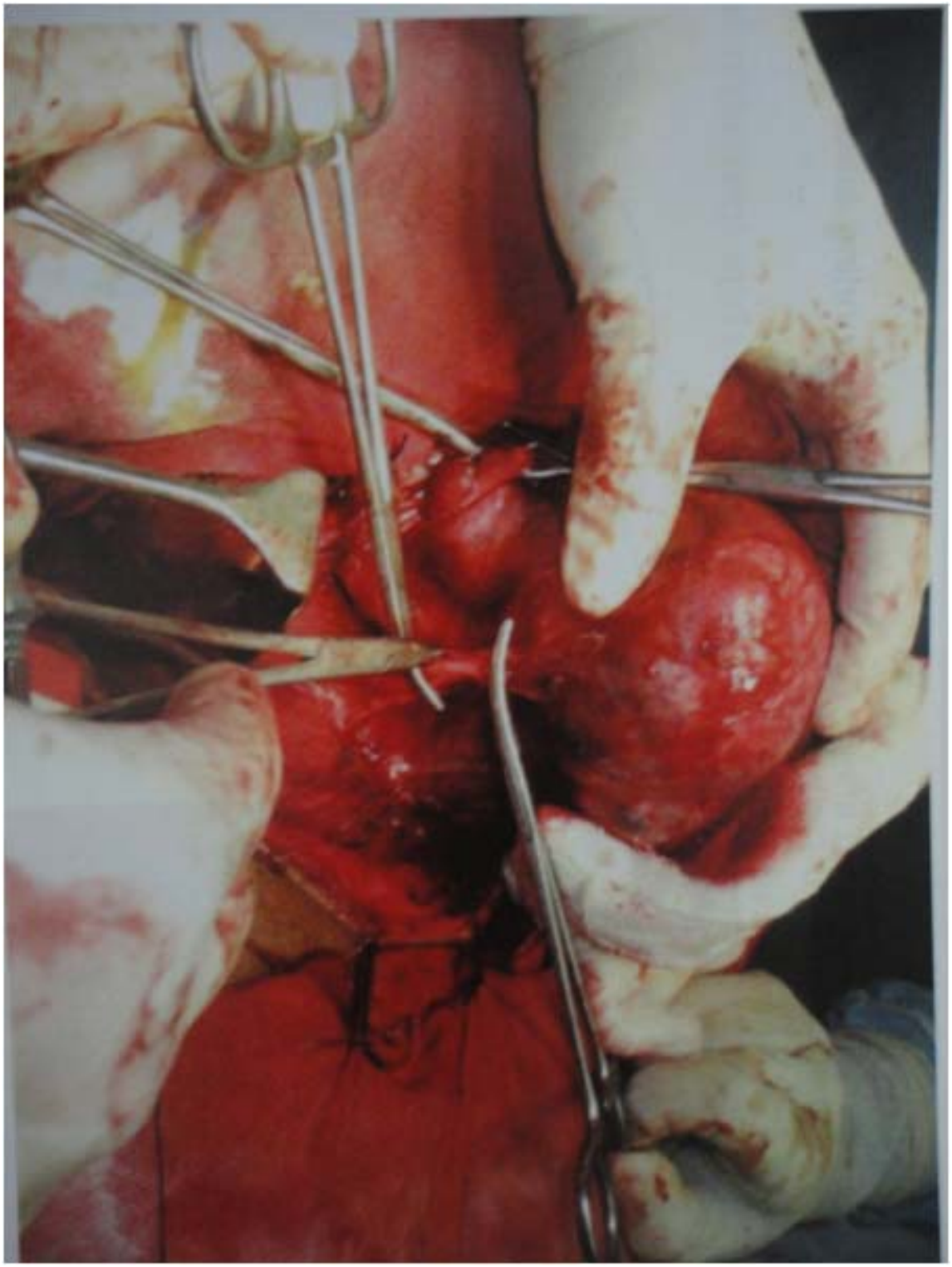
CAPSULAR DISSECTION-HUGGING THE THYROID

PRESERVATION OF PARATHYROIDS:

The inferior parathyroid is usually visualised first. It is situated anterior to recurrent laryngeal nerve and approximately 1 cm inferior to the point where the inferior thyroid artery crosses the recurrent laryngeal nerve. The superior parathyroid is usually more dorsal than the inferior parathyroid and is typically found posterior to the thyroid gland and posterior and medial to the recurrent laryngeal nerve at the level at which the nerve enters just posterior to the cricothyroid muscle at the level of cricoids cartilage. The superior gland is often easier to dissect from the thyroid gland on a vascular pedicle. The lateral parathyroid containing tissue is swept of the thyroid gland in a plane between the thyroid capsule and the inferior thyroid artery, ligating and dividing the tertiary branches of inferior thyroid artery on the capsule of thyroid gland.



DIVISION OF BERRY'S LIGAMENT

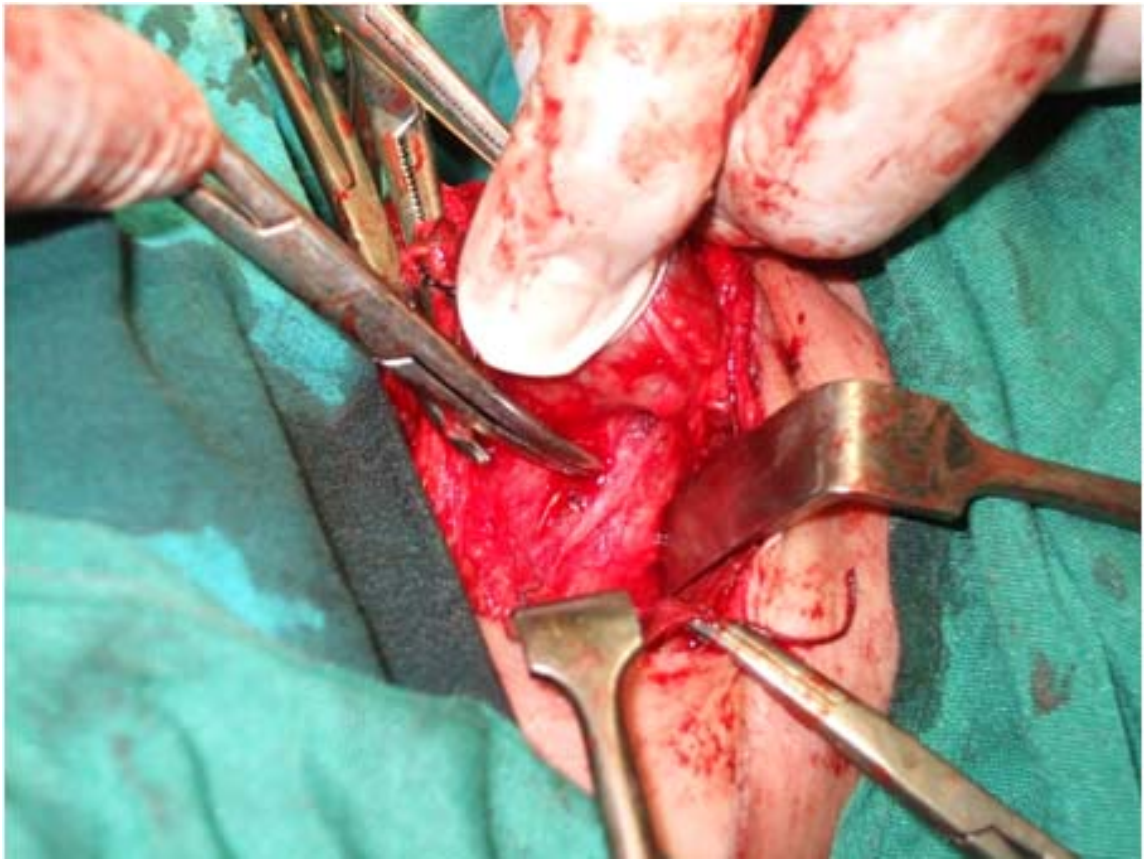


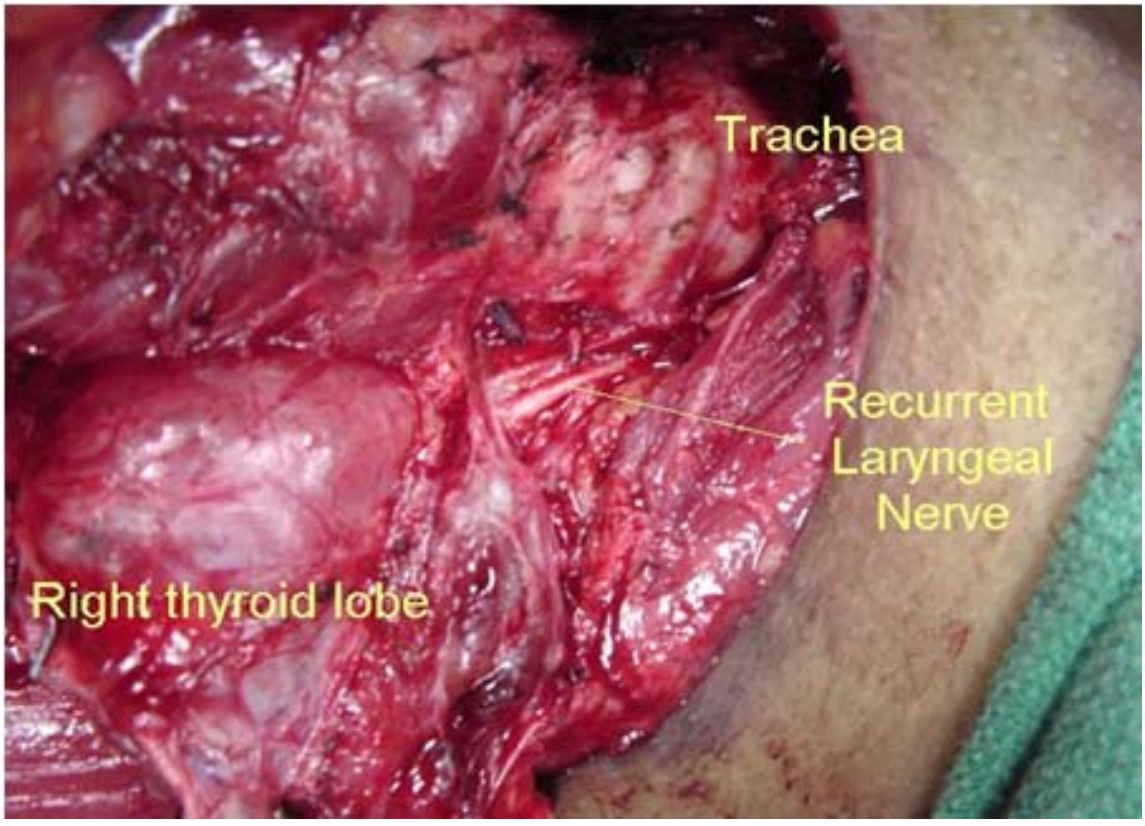
DIVISION OF BERRY'S LIGAMENT

RESECTION OF THE GLAND:

After clear identification and preservation of the parathyroid glands and the recurrent laryngeal nerve the thyroid lobe can be safely resected. The thyroid gland is now rotated more medially and anteriorly and the remaining attachments of the thyroid to the trachea are divided.the dissection at the ligament of berry may prove challenging. A small artery and vein almost always crosses the berry ligament. If bleeding occurs it should be controlled with gentle pressure. Clamps should not be applied blindly and diathermy use at this point is condemned. The thyroid lobe can be resected sharply from its attachment to the trachea.

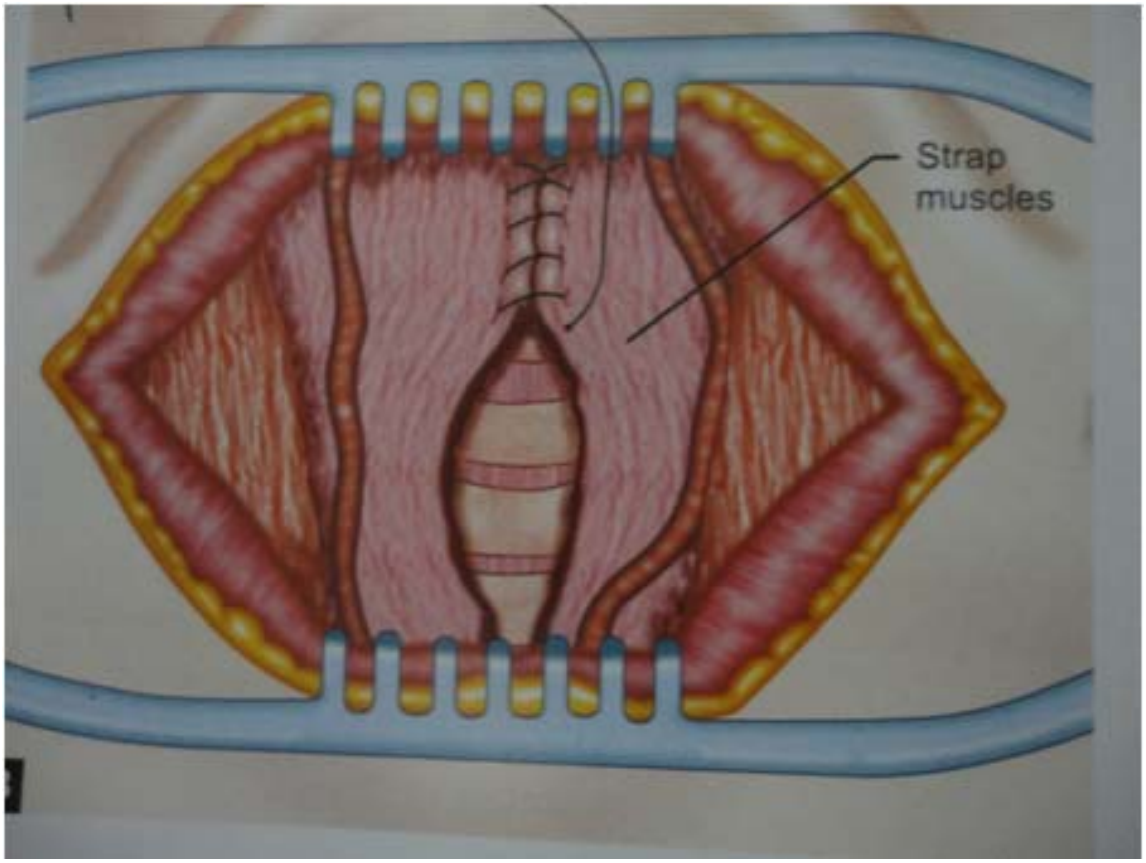
Similar procedure is carried on the other side in case of total thyroidectomy. After removing the specimen it's marked and packed for histopathology.



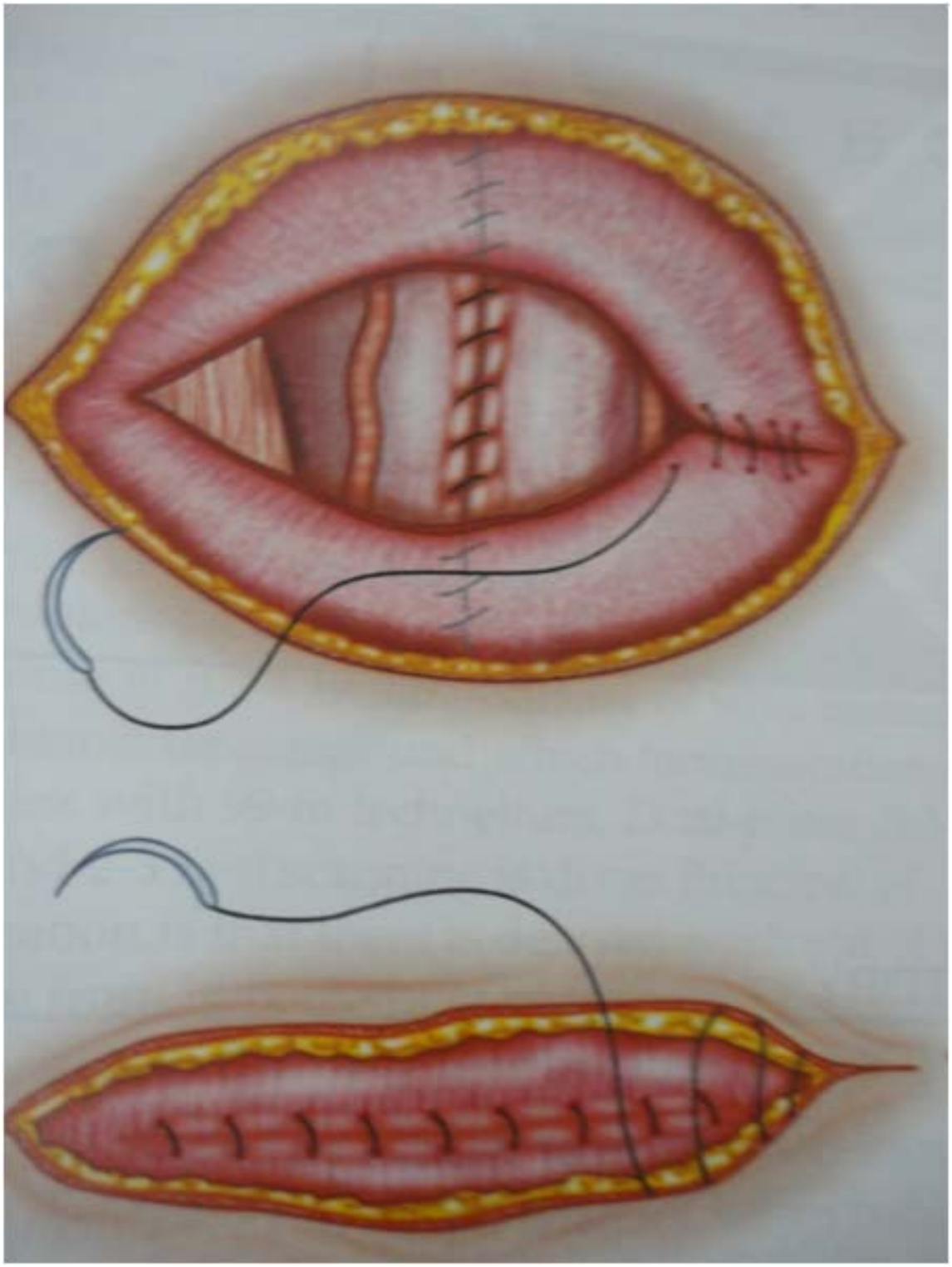

Trachea
Recurrent
Laryngeal
Nerve
Right thyroid lobe

CLOSURE:

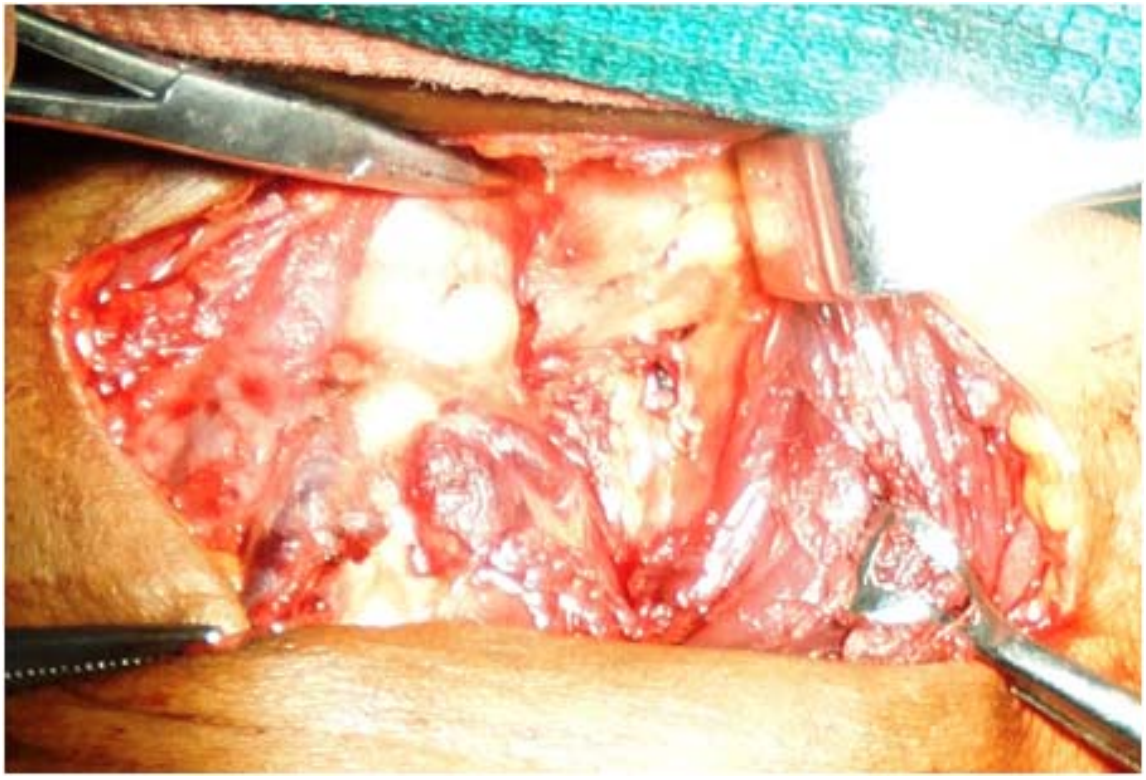
Thorough hemostasis should be secured before wound closure. Wash is given and the wound looked for any bleeding. The sand bag under the shoulder should be removed. Any bleeding on the surface of trachea can be controlled with bipolar. Bleeding from the trachea-oesophageal groove should never be cauterised. It should be tied. A suction drain or a corrugated rubber tube could be brought out through separate stab incision near the primary wound. The deep cervical fascia is closed in midline using absorbable suture like vicryl. If the strap muscles were cut during the procedure they are also sutured intermittently with absorbable sutures. Then subcutaneous tissue along with platysma is sutured with catgut. Skin closed by continuous subcuticular sutures.

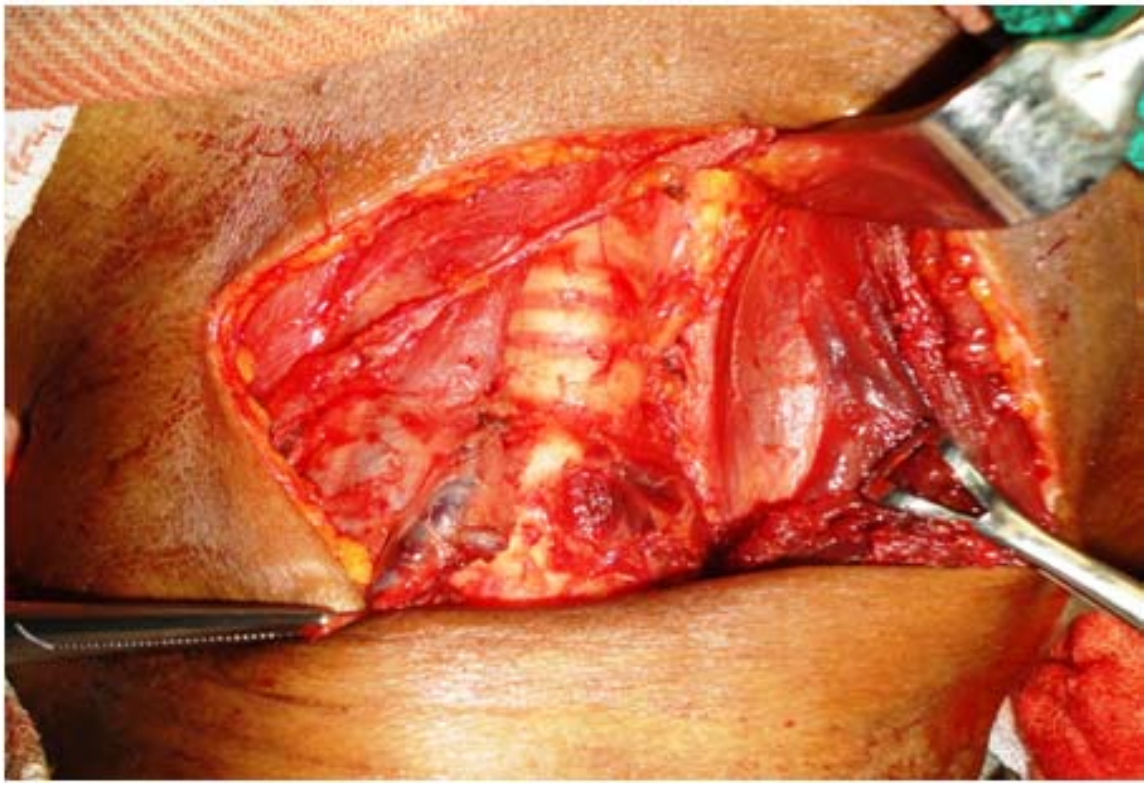


CLOSURE OF DEEP FASCIA AND STRAP MUSCLES



CLOSURE OF SUBCUTANEOUS TISSUE AND SKIN





SPECIM EN

REVIEW OF RESULT:

A total of 60 patients who underwent thyroidectomy were included in this study.

PREOPERATIVE PROTOCAL:

Thorough history was obtained from the patients like , how long the swelling was present, are they having any pressure symptoms , is there any recent change in voice, is there any sudden increase in size and any associated symptom of hypothyroidism or hyperthyroidism are present. Clinical examination of the swelling was then made to know about the size of the thyroid selling, nodularity in one or both the lobes, presence of nodes and any other swelling. All the patients had undergone laryngoscopic examination pre operatively and the status of their vocal cord was noted. Any patients who had palsy of recurrent laryngeal nerve with deviation of vocal cords were excluded from the study. Thyroid function test including free T4, free T3 and TSH were done to know about the functional status of thyroid. USG neck was taken to know more about the thyroid swelling and presence of nodules and nodes. FNAC of the swelling was then done to know about the pathology of the swelling. If the cytology came as papillary, CT scan of the neck was taken to know about the nodal status. If the cytology revealed anaplastic cells they were excluded from the study. X RAY of chest and cervical spine were then taken. Baseline investigations like complete blood count and renal function test with blood

sugar were taken. Anaesthetic assessment for surgery was then obtained. The procedure was then explained to the patient and a close relative and written consent was obtained from each patient. All patients with papillary carcinoma and follicular cytology underwent total thyroidectomy. Patients having multi nodular goitre had total thyroidectomy. Patients with solitary nodule of thyroid had either total thyroidectomy or hemi thyroidectomy on the involved side depending on the surgeon's preference.

PER OPERATIVE PROCEDURE:

They were divided in to two groups by randomisation in to group A and group B. In group A thyroidectomy was done with the identification and tracing the course of recurrent laryngeal nerve from lower down near the inferior thyroid artery to the point where it enters the larynx. The branches of inferior thyroid artery were ligated individually after the recurrent laryngeal nerve was identified. In group B thyroidectomy was done without routine identification of the nerve and the inferior thyroid artery was ligated away from the gland. Careful dissection was done while cutting the ligament of berry.

POST OPERATIVE FOLLOW UP:

Patient had a laryngoscopic examination immediately after ex-tubation and checked for position of vocal cords. On the first post op day any change in voice or hoarseness is elicited from the patient. Patient had laryngoscopic examination on the 5th post operative day before discharge. Patient was advised to follow up for change in voice and any deviation of vocal cords by laryngoscopy at third and sixth month.

Any hoarseness of voice associated with a documented shift of vocal cords persisting after sixth month is taken as permanent recurrent nerve injury.in case of recurrent laryngeal nerve injury there will be change in voice in the immediate post op period. Hoarseness of voice occurring in the 1st or 2nd post op day is mostly due to edema caused by inflammation & dissection of nerves & it is temporary.

STUDY CHARECTERISTIC:

The age group varied from eighteen to seventy (18-70).

INDICATION FOR SURGERY:

Multi nodular goitre -36

Solitary nodular goitre -10

Papillary cancer -10

Follicular neoplasm -03

Lymphocytic thyroiditis -01

Surgical procedure done:

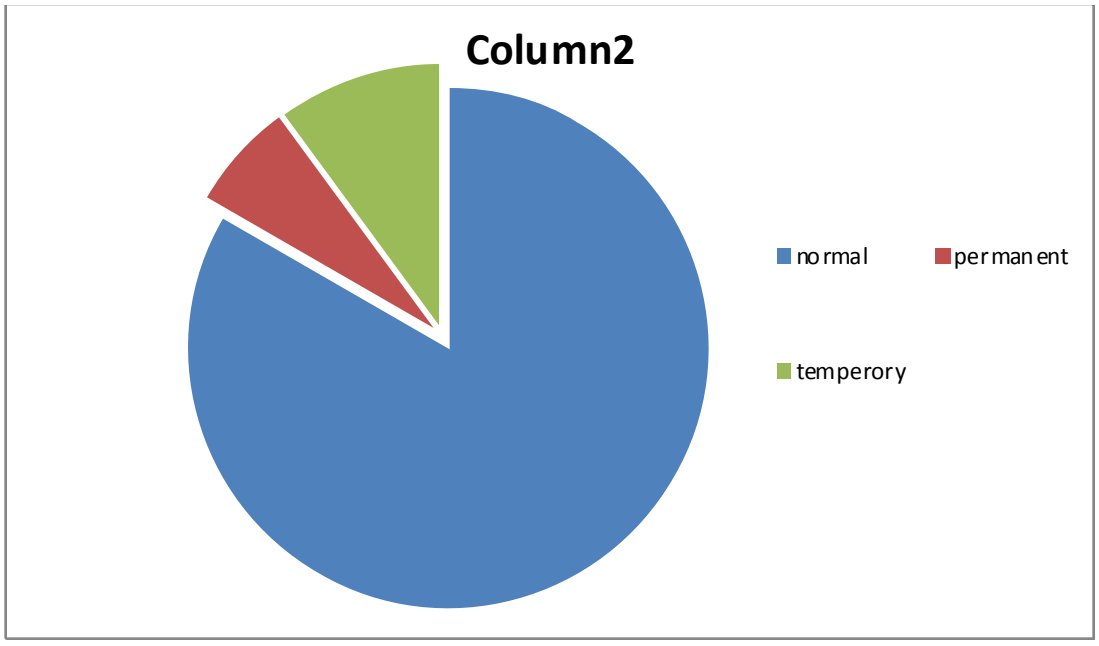
Total thyroidectomy -52

Hemi thyroidectomy -08

Out of 60 patients, fifty two patients underwent total thyroidectomy and eight patients had hemi thyroidectomy. 112 recurrent laryngeal nerves were at risk.

Outcome:

In the immediate post op period, 10 patients had hoarseness of voice. Indirect laryngoscope was done on fifth post op day which showed deviation of recurrent laryngeal nerve in four patients only. The remaining six patients had edema of vocal cords which decreased with time and voice became normal in these six patients. Indirect laryngoscopic examination done on sixth month revealed permanent recurrent laryngeal nerve injury in four patients. The incidence of recurrent laryngeal nerve injury in this study as a whole is 6.6%



GROUP CHARECTERISTIC:

Group A:

In group A, the age of the patients were 18-62 with a mean age of 34. Seventeen patients had multi nodular goitre, six patients papillary carcinoma had, five patients had solitary nodule of thyroid, one patient had follicular neoplasm and one patient had lymphocytic thyroiditis. Twenty six patients underwent total thyroidectomy and four patients had hemi thyroidectomy. Fifty eight recurrent laryngeal nerves were at risk. Out of thirty patients who underwent thyroidectomy, four patients (13%) had hoarseness of voice in the immediate post op period but their vocal cord examination was normal on table. Also laryngoscopic examination on fifth post op was normal. Hoarseness of voice improved and voice become normal by first week. Examination on sixth month was normal. The incidence of permanent recurrent laryngeal nerve palsy in group A is 0%.

Group B:

The age group of the patients were 18-70 with a mean age of 40.

Nineteen patients had multi nodular goitre, four patients had papillary carcinoma, five patients had solitary nodule of thyroid and two persons had follicular neoplasm. Twenty six patients had total thyroidectomy and four patients had hemi thyroidectomy. Fifty six recurrent laryngeal nerves were at risk during the procedure. Out of thirty patients six patients had hoarseness of voice in the immediate post op period. Laryngoscopic examination done on fifth post op day revealed deviation of vocal cord in four of these patients. It was normal in remaining patients and the voice also became normal in those two patients. On follow up these four patients had persistent hoarseness of voice and deviation of recurrent laryngeal nerve and declared to have permanent unilateral recurrent laryngeal nerve injury. The incidence of recurrent laryngeal nerve injury in group B is 13%.

Statistical analysis:

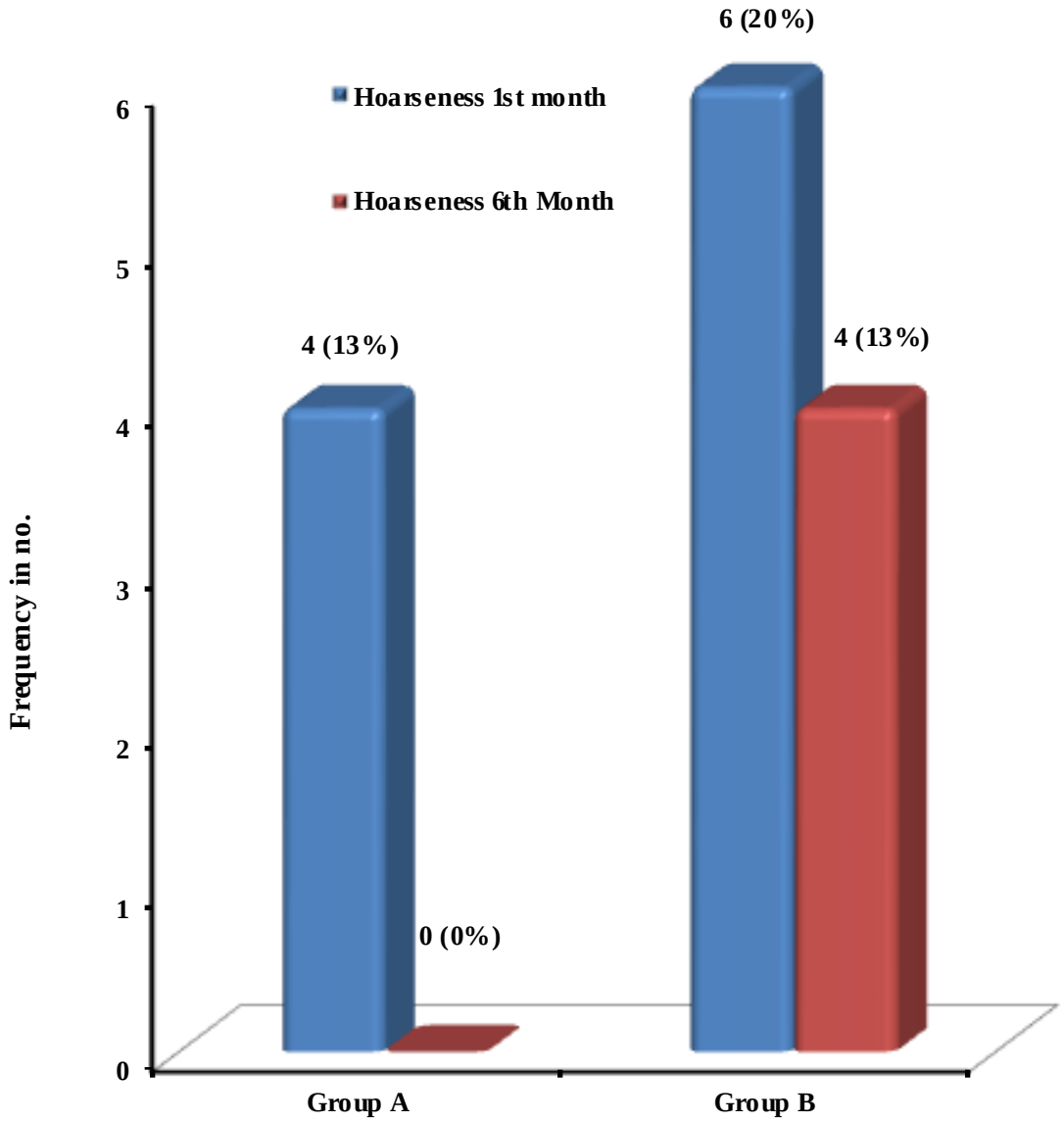
The results of two groups were compared using chi square analysis. The p value is 0.035. The p value is less than 0.05. The analysis showed that p value is significant and the test is significant. Statistically group A is better than group B.

.

CHI SQUARE TEST:

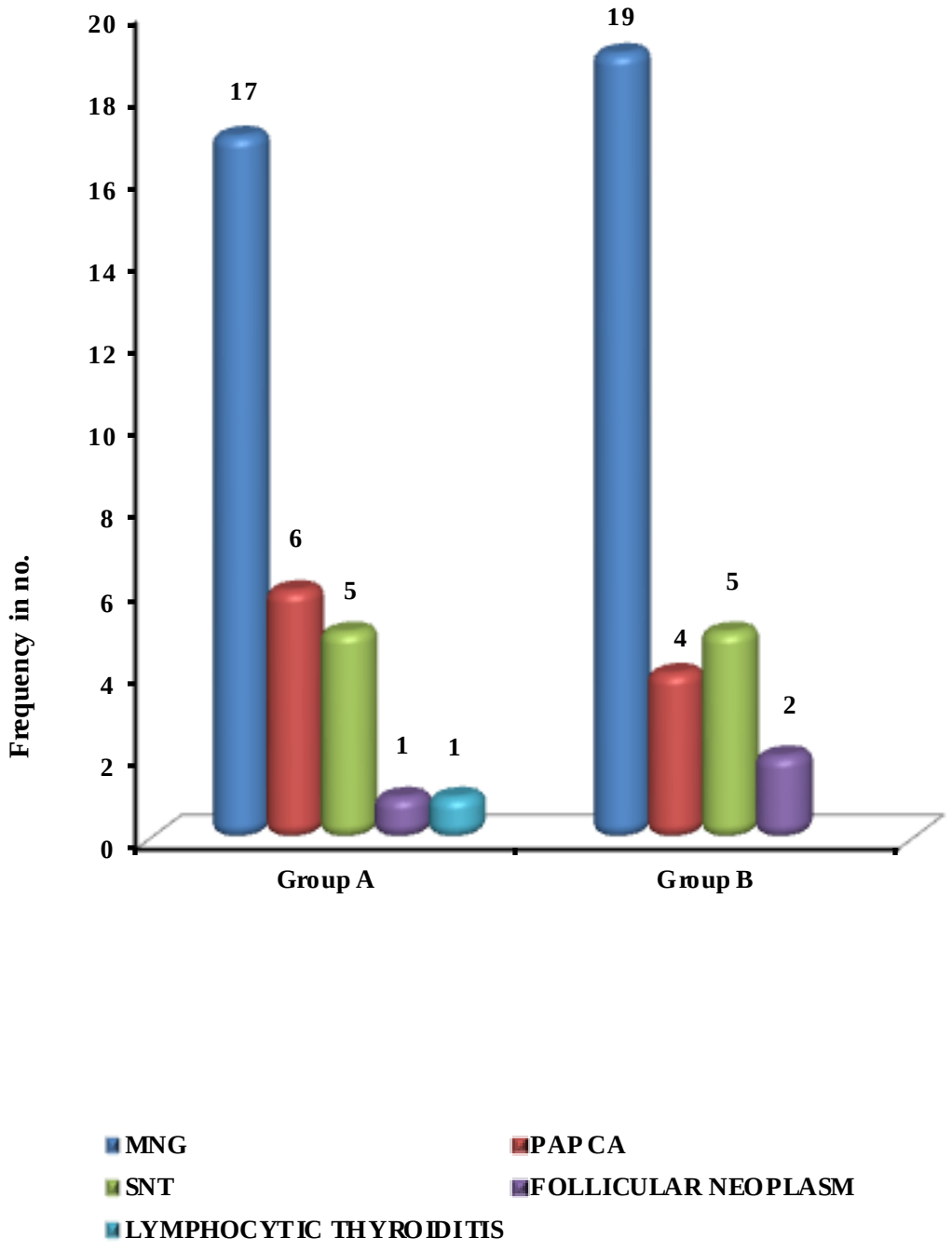
Group	Hoarseness		P – Value
	1st month	6th Month	
Group A	4	0	0.035 < 0.05
Group B	6	4	

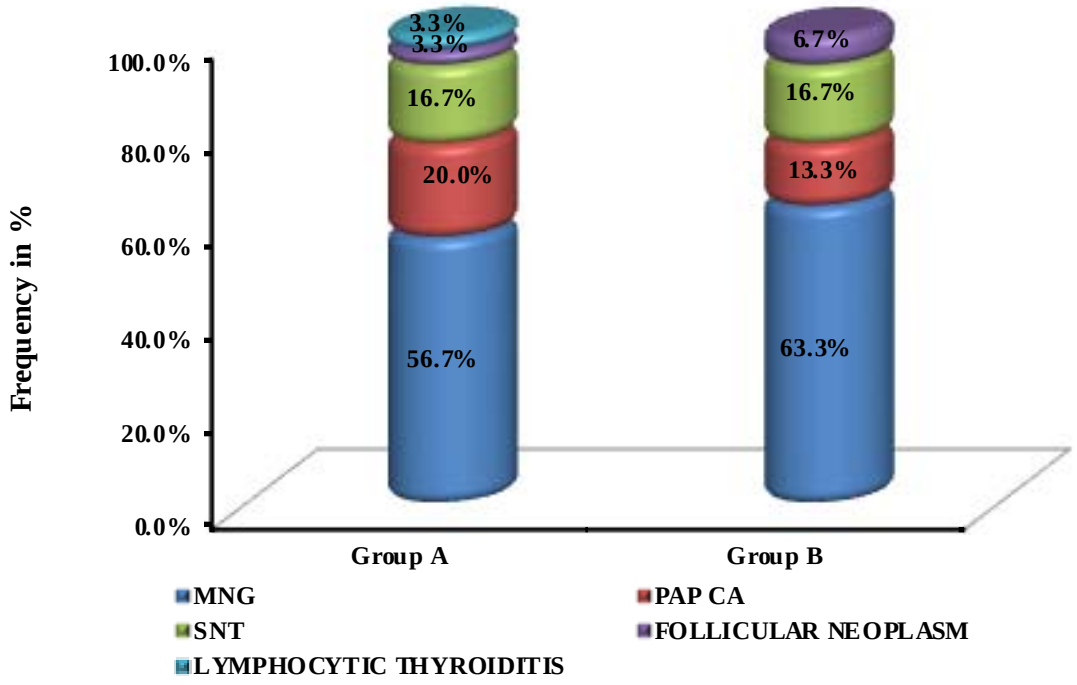
Statistically significant, Group A is better than Group B



CHI SQUARE TEST

Diagnosis	Group A	Group B
MNG	17	19
PAP CA	6	4
SNT	5	5
FOLLICULAR NEOPLASM LYMPHOCYTIC THYROIDITIS	1 1	2
Total	30	30


20
18
16
14
12
10
8
6
4
2
0
Frequency in no.
17
6
5
1
1
19
4
5
2
Group A
Group B
MNG
PAP CA
SNT
FOLLICULAR NEOPLASM
LYMPHOCYTIC THYROIDITIS



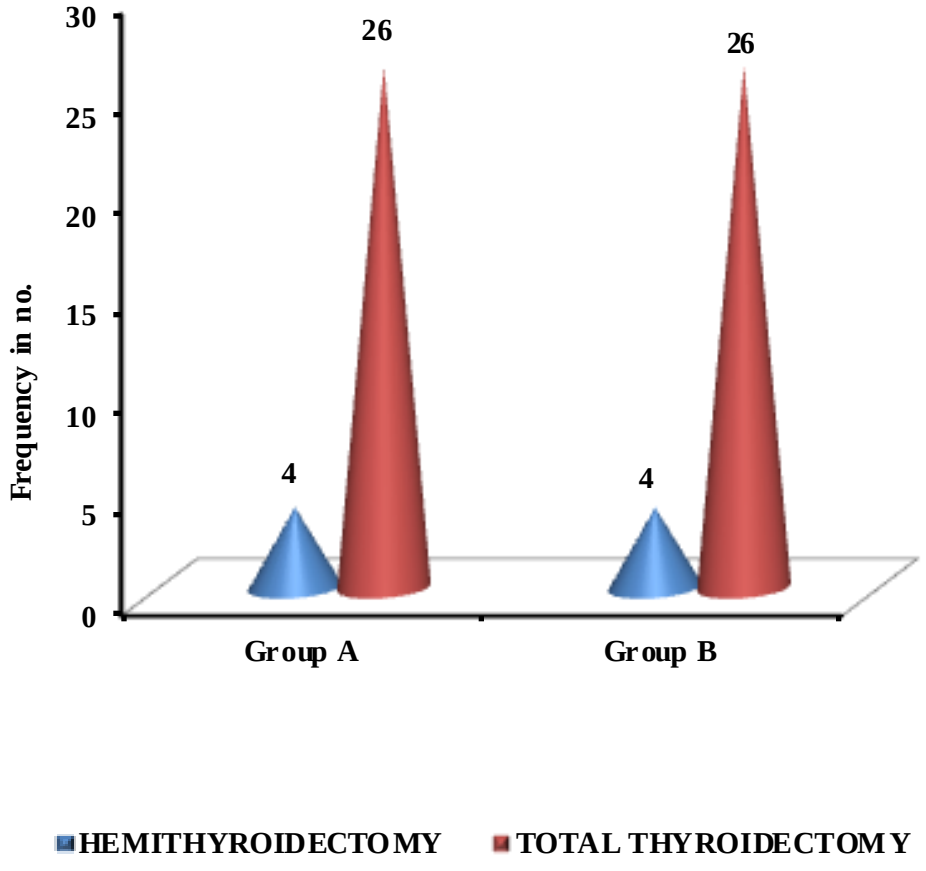
INDICATIONS FOR THYROIDECTOMY

AGE GROUP:

Age – Group A - 33.9±10.0 – Min – 18, Max - 62

Group B - 40.2±14.0 – Min – 18, Max – 70

Procedure	Group A	Group B
HEMITHYROIDECTOMY	4	4
TOTAL THYROIDECTOMY	26	26
Grand Total	30	30



CONCLUSION:

Routine systematic exposure of recurrent laryngeal nerves reduces the incidence of complications in thyroid surgery to a minimum. After the superior pedicle is ligated, the recurrent laryngeal nerve should be identified and its course traced to the entry at larynx. If we do a dissection of recurrent laryngeal nerve over its entire course we will be able to avoid any inadverant damage to any pre laryngeal branches if present. Before operating on a thyroid we should have a thorough knowledge of anatomy and variations of the thyroid and recurrent laryngeal nerve. Dissection should be meticulous with thorough hemostasis.

RLN identification is protective more than non-identification & consequently peroperative nerve identification is strongly recommended.

BIBLIOGRAPHY

1. Mishra SK. Monograph on thyroid cancer. Japan International Cooperative Agency; 1997.

2. Kishore S, Edward P, Lawrence AM. Tumors of thyroid gland comprehensive textbook of oncology. Baltimore: William and Wilkins 1991; 2:1393-405.

3. Brunicadi FC, Andersen DK, Billicer TR, Dunn DL, Hunter JG, Pollod RE. Schwartz Principles of Surgery. 8th ed. McGraw-Hill Medical Publishers; pp. 1396-7.

4. Duffy BJ Jr, Fitzgerald PJ. Cancer of thyroid in children, a report of 28 cases. J Clinical Endocrine Metabolism 1950; 159:1007.

5. Orell SR, Sterret GF, Waler M N-I, Whitaker D. Manual and atlas of fine needle aspiration cytology. Churchill Livingstone;1992. pp. 96-128.

6. Seleni ST, Gakiopoulou H, Kauantzas N, Ayrogiannis G, Givalos N, Stratiosputsouris EF. CANCER. Cytopahtology CA section. American Cancer Society Journal of Cancer. 2001;111(2):130-6.

7. Erickson L, Jin L, Nakamara N, Jin L, Nakamara N, Bridges AG, Markoric SN, Lloyd RV. A study of clinicopathologic feature in cutaneous metastases from well differentiated thyroid cancer. Interdisciplinary International Journal of American Cancer Society, Cancer 2007;109(10):1965-71.

8. Alia P, Pablo, Morena P, Rigo R, Francos JM, Navaro MA. A study regarding post-resection PTH and PTH decline accurately predict hypocalcemia

after thyroidectomy. American Journal of Cytopathology 2007 April;127(4):592-7.

9. Kebebar E, Reiff E. Patient with differentiated thyroid cancer have venous gradient in thyroglobulin level, Interdisciplinary International Journal of American Cancer Society 2007;109(6):1078-81.

10. Stephceme Regan, Michelle McNicholas, Stephen J Eustace. Anatomy for diagnostic imaging. p. 36.

11. Henry JF. Surgical Anatomy and Embryology of the thyroid and parathyroid glands and recurrent and external laryngeal nerves. eds Clark O.H, Duh Q.Y. Textbook of Endocrine Surgery. Philadelpia, W.B Saunders,1997;pp 8-14.

12. Hollingshed W. Anatomy for surgeons, Vol 1. The head and neck. New York: Hobes 1954.

13. Noguchi S, Hoguchi A, Murakani N. The value of lymph node dissection in patients with differentiated thyroid cancer. Surgical Clinics of North America. 1987; 67:251.

14. Noguchi S, Murakani N. Papillary carcinoma of the thyroid developing patterns of metastases. Cancer 1970; 26:1053.

15. Henry JF, Audiffret J, Denizot A, et al. The non-recurrent inferior laryngeal nerve: Review of 33 cases including two on the left side. Surgery 1988; 104:977 -984.

16. Lennquist S, Cahlin C, Smeds S. The supenor laryngeal nerve in thyroid surgery. Surgery 1987; 102:999-1008.

17. Tata Memorial Hospital. Hospital cancer registry. Annual report 1999. Division of Epidemiology and Biostatistics, Tata Memorial Hospital, Mumbai. 2003: 1921.

18. Cutler S, Young J. 3rd National Cancer Surveillance incidence data, NCI, Washington DC. 1975 Monograph no 41.

19. Boring C, Squires T. Cancer Statistics 1993. CA Cancer J Clinics 1993; 43:7.

20. Parkin D, Stiller C, Draper G et al. International incidence of childhood cancer. IARC Scientific publications, 1988.

21. Fukunaga F, Yatani R. Geographical pathology of occult thyroid carcinoma. Cancer 1975; 36:1095.

22. Dos Santos Silva I, Swerdlow A. Sex differences in the risks of hormonedependant cancers. American journal of epidemiology 1993; 138:10.

23. Woolner LB, Beahrs 0, Block B et al. Classification and prognosis of thyroid carcinoma. American journal of surgery 1962; 102:354.

24. Yole BB. Descreptive Epidemiology 'of thyroid cancer in greater Bombay. Indian J Surg. 1988; 35: 57-62.

25. Pottern L, Stone B, Day Net al. Thyroid cancer in Connecticut, 1935-1975: an analysis by cell type. American journal of epidemiology. 1980; 112:764.

26. Brennan M. USSR: Medical effects of Chernobyl disaster. Lancet 1990; 335:1086.

27. Hall P, Berg G, Bjelkengren G et al. cancer mortality after 1131 for hyperthyroidism. Int J cancer 1992; 50:886.

28. Bell B, Mazzaferri EL. Gardner's syndrome and thyroid carcinoma. A case report and review ofliterature. Dig Dis Sci 1993; 38:185.

29. Grossman RF, Tu SH, Duy KY et al. Familial non-medullary thyroid cancer. Arch Surg 1995; 130:892.

30. Loh KC. Familial non-medullary thyroid carcinoma: a metareview of case series. Thyroid 1997; 7:107.

31. Williams EL. TSH and thyroid cancer. Horm. Met. Resp. 1990; 23:S72.

32. Breaux E, Guillamondegui O. Treatment of locally invasive carcinomas of the

thyroid: How radical? American J Surgery 1980; 140:514-516.

33. Schroder S, Boeker W, Dralle H, Kortmann K, Stem C. The encapsulated papillary carcinoma of the thyroid: a morphological subtype of papillary thyroid carcinoma. Cancer 1984; 54:90-93.

34. Woolner LB. Thyroid carcinoma: Pathological classification with data on prognosis. Seminars in Nuclear medicine. 1971; 1 :481-502.

35. Gray A, Doniach 1. Morphology of the nuclei of papillary thyroid carcinoma.

British journal of cancer. 1969; 23:49-51.

36. Meissner WA, Adler A. Papillary carcinoma of the thyroid: A study of the pathology of226 cases. Archives of pathology. 1958; 66:518-525.

37. Klinck.GH, Winship T. Psammoma bodies and thyroid cancer. Cancer l959; 12:656-662.

38. Oertel J, LiVolsi VA. pathology of thyroid diseases. In: Ingbar, Braverman eds.

Werner's- The thyroid: A fundamental and clinical text. 5th edition. Philadelphia:

JB Lippincott co 1986; 667-672.

39. Electron Kebebew, Orlo HC. Papillary thyroid cancer. Gerhard M Doherthy, Britt

S eds. Surgical endocrinology. Philadelphia: Lippincott Williams & Wilkins; 2001. p. 60.

40. Fukunaga F, Lockett L. Thyroid carcinoma in the Japanese in Hawaii. Arch Pathology. 1971; 92:6.

41. Callender D, Sherman S, Gagel R, Burgess M, Goepfert H. Cancer of the thyroid. Suen, Myers eds. Cancer of the head and neck.3rd edition. 1996: 422.

42. Hoie J, Stenning H, Kullman G, Lindegard M. Distant metastases in papillary thyroid cancer. Cancer198 8; 61 : 1-6.

43. Lang W, Georgii A, Stauch G, Keinzle E. The differentiation of atypical adenomas and encapsulated follicular carcinomas in the thyroid gland. Virchow's Archive 1980; 385:125-141.

44. Hedinger C. Histological typing of thyroid tumours. 2nd edition. Berlin: Springer- Verlag. 1988:1-34.

45. Baloch Z, Gupta P, Yu G, et al. Follicular variant of papillary carcinoma. Cytologic and histologic correlation. American J of clinical pathology.1999; 111:216-222.

46. Thompson N, Dunn E, Batsakis J, Nishiyama R. Hurthle cell lesions of the thyroid. Surg. Gynecol. Obstet. 1973; 139:555.

47. Carcangiu ML, Zampi G, Rosai J. Poorly differentiated (insular) thyroid carcinoma. American Journal of Surgical Pathology 1984;8(9):655-68.

48. Burman K, Ringel M, Wartofsky L. Unusual types of thyroid neoplasms. Endocrine metabolism clinics of North America. 1996; 25(1):49-68.

49. Venkatesh Y, Ordonez, Schultz P. Anaplastic carcinoma of thyroid. Cancer 1990; 66:321-330.

50. Gilliand FD, Hunt WC, Morris DM, et al. Prognostic factors for thyroid carcinoma: a population based study of 15,698 cases from 1973-1991. Cancer 1997; 79:564-573. Hedinger C, Williams ED, Sobin LH. Histological typing of thyroid tumours. International histological classification of tumours, 2nd ed. WHO. Berlin, Springer- Verlag. 1988.

52. Li Volsi V. Papillary lesions of the thyroid. In: Surgical pathology of the thyroid. Philadelphia.WB Saunders. 1990:136.

53. Chong F, Beahrs 0, Sizemore G, Woolner LH. Medullary cancer of the thyroid. Cancer 1975; 35(3):695-704.

54. Block MA, Jackson CE, Greenawald KA, Yott JB, Tashjian AH. Clinical

characteristics differentiating hereditary from sporadic medullary carcinoma. Archives surgery. 1980; 115:142-148.

55. Doughlas LF, Skarulis M, Livolsi V. Thyroid tumours. Cancer- principles and practice of oncology. 6th edition. Lippincott Williams and Wilkins.2002: 1757.

56. Ashcraft W, VanHerle. Management of thyroid nodules. Part I. Head Neck Surgery 1981; 3:216.

57. Simpson WJ. Papillary and follicular thyroid cancer. Prognostic factors in 1578 patients. American Journal of Medicine. 1987; 83:479.

58. Kozol RA, Geelhoed GW, Flynn SD, et al. management of ectopic thyroid nodules. Surgery 1993; 114(6): 1103-1107.

59. Shaha A, Alfonso AE, Jaffe BM. Operative treatment of substernal goiter. Head Neck 1989; 11(4): 325-330.

60. Samman NA, Ordonez NG. Uncommon types of thyroid cancer. Endocrine Metab Clin of North America. 1990; 19:637-648.

61. Behar R, Arganini M, Wu TC, et al. Graves' disease and thyroid cancer. Surgery 1986; 100:1121.

62. Bergholm U, Adami HO, Bergstrom R, et al. Clinical characteristics in sporadic and familial medullary thyroid carcinoma. Cancer 1989; 63: 11961204.

63. Mure A, Gicquel C, Abdelmoumene N, et al. Cushing's syndrome in medullary thyroid carcinoma. Jour Endocrinol Invest 1995; 18:180-185.

64. Martino E. Releasing hormone and thyroid supressibility following anti-thyroid drug therapy for hyperthyroidism. Journal of Clin. Endo. Metabolism1976; 43:543.

65. Christensen S, Bondenson L, Ericsson U. Prediction of malignancy in solitary thyroid nodule by physical examination, thyroid scan, fine needle biopsy and serum thyroglobulin: Prospective study of 100 surgically treated patients. A~ta Chir Scand 1984; 150;433.

66. Melvin K, Miller H, Tashijian A. Early diagnosis of medullary carcinoma by means of calcitonin assay. New England journal of medicine 1971; 285:1115.

67. Moley J. Medullary thyroid cancer. Surg. Clin North 1995; 75;405-420.

68. Ledger G, Khosla S, Lindor N. Genetic testing III the diagnosis and management of MEN type II. Annals ofInternal medicine. 1995; 122: 118-124.

69. Piromalli D, Martelli G, Del Prato, Collini P, Pilotti S. The role of fine needle aspiration in the diagnosis of thyroid nodules.

70. Oertel Y C ,Oertel J E. Diagnosis of benign thyroid lesions: Fine needle aspiration and histopathologic correlation. Ann Diagn Pathol. 1998; 2:250-263.

71. Kini SR , Miller JM, Hamburger JI.Cytophaology of Hurthle cell lesions of the thyroid gland by fine needle aspiration. Acta cytol. Baltimore. 1981; 25 : 647652.

72. Baloch ZW,Gupta PK , Yu GH, Sack MJ, Livolsi VA. Follicular variant of Papillary Carcinoma. Cytology and Histologic Correlation. Am J Clin pathol.

1991;111:216-222.

73. Kobayashi A, Kuma K, Matsuzuka F, Hirai K, Fukata S, et.al.Thyrotoxicosis after needle aspiration of thyroid cyst. J Clin Endocrinol Metab.1983; 56: 26-29.

74. Hill C, Ibanez M, Nagiub A. Medullary thyroid carcinoma. Medicine 1973

75. James EM, Charbomeau JW, Hay rD. The Thyroid. eds. Rumack CM, Wilson SR, Charbomeau JW. Diagnostic ultrasound. St. Louis: Mosby Year Book; 1991. pp. 507-23.

76. Cady B, Rossi R. An expanded view of risk-group definition in differentiated thyroid carcinoma. Surgery 1988; 104:947.

77. Pasieka JL, Zedenius J, Auer G, et al. Addition of nuclear DNA content to the AMES risk group classification for papillary thyroid carcinoma. Surgery 1992; 112:1154.

78. Hay ill, Grant CS, Taylor WF, McConahey WM. Ipsilateral lobectomy versus bilateral lobar resection in PTC: a retrospective analysis of surgical outcome using a novel prognostic scoring system. Surgery 1987; 102(6):1087.

79. Hay ID, Bergstralh E, Goellner J, Ebersold J, Grant C. Predicting outcome in papillary thyroid carcinoma. Development of a reliable prognostic scoring system. Surgery 1993; 114:1050.

80. Rate of complications with systematic exposure of the recurrent laryngeal nerve and parathyroid glands in operations for benign thyroid gland diseases. al-Fakhri N, Schwartz A, Runkel N, Buhr HJ. Klinik für Allgemein-, Gefäss- und

Thoraxchirurgie, Universitätsklinikum Benjamin Franklin, Freie Universität Berlin.

81. Reducing the rate of recurrent nerve paralysis by routine exposure of the nerves in thyroid gland operations. Mättig H, Bildat D, Metzger B.Chirurgische Abteilung, Kreiskrankenhauses Bergmannswohl Schkeuditz Akademisches Lehrkrankenhaus.

82. Recurrent Laryngeal Nerve in Thyroid Surgery: Is Routine Identification necessary? *Journal of Rawalpindi Medical College (JRMC); 2008;12(1):16-18*

83. Recurrent Laryngeal Nerve Injury in Thyroid Surgery

Hazem M. Zakaria,1 Naif A. Al Awad,1 Ali S. Al Kreedes,1 Abdul Mohsin A. Al-Mulhim,1 Mohammed A. Al-Sharway1, Maha Abdul Hadi,1 Ahmed A. Al Sayyah2

84. The Incidence Of Recurrent LaryngealNerve Injury During Thyroid Surgery

Laith Hindosh CABS, ** Mumtaz Alnas FRCS, Raid E. Rassam DGS, FICMS

85. A Closer Look at Laryngeal Nerves during Thyroid Surgery: A Descriptive Study of 584 Nerves P. V. Pradeep, B. Jayashree, and Skandha S. Harshita

NAME	AGE	I.P.NO	DIAGNOSIS	PROCEDURE DONE	IMMEDA=IATE POST OP	IDL ON TABLE	5TH DAY	3RD MTH	6TH MONTH
SREEJA	27	93932	LYMPHOCYTIC THYROIDITIS	TOTAL THYROIDECTOMY	HOARSENESS	N	HOARSENESS	N	N
ARULMOZHI	29	48717	LT SNT	L HEMITHYROIDECTOMY					
CHINNAPILLAI	47	53394	MNG	TOTAL THYROIDECTOMY					
UMA	37	61836	PAP CA	TOTAL THYROIDECTOMY					
RATHINAMMAL	62	59910	MNG	TOTAL THYROIDECTOMY					
DESAMMAL	40	80417	MNG	TOTAL THYROIDECTOMY					
DEVAKI	42	79232	RT SNT	R HEMITHYROIDECTOMY	HOARSENESS	N	HOARSENESS	N	N
PONNI	35	76332	MNG	TOTAL THYROIDECTOMY					
KANAGA	35	64737	MNG	TOTAL THYROIDECTOMY					
SARAMMAL	30	59638	SNT	TOTAL THYROIDECTOMY					
AMALA	25	52700	MNG	TOTAL THYROIDECTOMY					
PODHUPONNU	36	47919	MNG	TOTAL THYROIDECTOMY					
NAGALAKSHMI	48	45513	MNG	TOTAL THYROIDECTOMY					
AMMU	27	36615	RT SNT	R HEMITHYROIDECTOMY	HOARSENESS	N	HOARSENESS	N	N
KAMALAMMAL	38	34293	MNG	TOTAL THYROIDECTOMY					
SATHYAVANI	36	36488	MNG	TOTAL THYROIDECTOMY					
SELVARANI	40	34144	PAP CA	TOTAL THYROIDECTOMY					
ARUNA	25	32956	LT SNT	L HEMITHYROIDECTOMY					
MADANGI	20	31915	PAP CA	TOTAL THYROIDECTOMY					
SHANTA	49	28083	MNG	TOTAL THYROIDECTOMY					
SOWJANNAMAL	35	10258	PAP CA	TOTAL THYROIDECTOMY					
ANITHA	23	21192	MNG	TOTAL THYROIDECTOMY					
MARY	25	21186	MNG	TOTAL THYROIDECTOMY					
SULTHANI	32	18167	MNG	TOTAL THYROIDECTOMY	HOARSENESS	N	HOARSENESS	N	N
SHANTHI	43	18164	MNG	TOTAL THYROIDECTOMY					
MANUGANDHI	25	76744	PAP CA	TOTAL THYROIDECTOMY					
VIJITHA	18	66719	PAP CA	TOTAL THYROIDECTOMY					
UMA	24	64653	MNG	TOTAL THYROIDECTOMY					
CHINNAPONNU	40	35078	MNG	TOTAL THYROIDECTOMY					
KANNIKUMARI	23	24494	FOLLICULAR NEOPLASM	TOTAL THYROIDECTOMY					

Originality | GradeMark | PeerMark

INCIDENCE OF RECURRENT LARYNGEAL NERVE PALSY IN THYROIDECTOMY-

BY MAHESH SHANKAR DOYOBA M.S. GENERAL SURGERY

turnitin 20% SIMILAR -- OUT OF 0

INTRODUCTION:

Surgery of the thyroid is one of the most common surgical procedures. One of the dreaded complications following thyroid surgery is recurrent laryngeal nerve (RLN) palsy. Various techniques of thyroidectomy have been described historically to avoid the injury to recurrent laryngeal nerve. The rate of recurrent laryngeal nerve injury is about **1-5%** in the hands of an experienced surgeon & the rate varies according to the expertise of the operating surgeon.

One area of much debate among the surgeons is the dissection of

Match Overview

1 famona.secampo.rs Internet source 4%

2 www.ncbi.nlm.nih.gov Internet source 1%

3 Mathai, John. Publication 1%

4 Marlin Steurer. "Advan... Publication 1%

5 Jyotimay Sharma. Publication 1%

6 Vishy Mahadevan. Publication 1%

7 Ruth E. M. Bowden. Publication 1%

8 Shaha, Ashok, and Publication 1%

turnitin

Your digital receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

Paper ID	292963211
Paper title	INCIDENCE OF RECURRENT LARYNGEAL NERVE PALSY IN THYROIDECTOMY-IDENTIFICATION VERSUS NON-IDENTIFICATION OF RECURRENT LARYNGEAL NERVE
Assignment title	Medical
Author	Naveeth Shukkur 22101009 M.S. General Surgery
E-mail	nave.muchi@gmail.com
Submission time	22-Dec-2012 11:46PM
Total words	7465

First 100 words of your submission

INTRODUCTION: Surgery of the thyroid is one of the most common surgical procedures. One of the dreaded complications following thyroid surgery is recurrent laryngeal nerve (RLN) palsy. Various techniques of thyroidectomy have been described historically to avoid the injury to recurrent laryngeal nerve. The rate of recurrent laryngeal nerve injury is about 1-5% in the hands of an experienced surgeon & the rate varies according to the expertise of the operating surgeon. One area of much debate among the surgeons is the dissection of recurrent laryngeal nerve. One school of thought is to stay away from the recurrent laryngeal nerve. Their view is if the nerve is seen, it's injured. Nowadays it...

Copyright 2012 Turnitin. All rights reserved.